Witness Name: Professor Sir Christopher Whitty
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UK COVID-19 INQUIRY
MODULE 2

FIRST WITNESS STATEMENT OF PROFESSOR SIR CHRISTOPHER WHITTY

Contents

I, PROFESSOR SIR CHRISTOPHER JOHN MACRAE WHITTY, will say as follows:

Section 1: Introduction

1.1. I am the current Chief Medical Officer ("CMO") for England. I make this corporate statement on behalf of the Office of the Chief Medical Officer ("OCMO") and in response to a draft Rule 9 request received from the UK COVID-19 Inquiry ("the Inquiry") on 21st September 2022 and additional questions received on 29th June 2023.

1.2. I would like to say at the outset of this statement that I am grateful to the Chair for the work that is being undertaken by this Inquiry. The pandemic has been a tragedy on a global scale and there are important lessons to be learned both in relation to the handling of pandemics and in wider social, economic and political decision-making. The Inquiry will offer an important opportunity to learn from the recommendations arising from the evidence to improve public health in the United Kingdom for future pandemics and major epidemics. We share with all our fellow healthcare professional colleagues great sadness at the many lives this pandemic took in England, the UK and around the world and would like to express our deep personal sympathies for bereaved families and all those who have suffered as a result of the COVID-19 pandemic.

1.3. This corporate statement explains the role of the OCMO, the part it played in the Governmental response to the COVID-19 pandemic and then addresses the matters raised in the Rule 9 request insofar as they relate to the activities of the OCMO. The statement has been prepared at an early stage to assist the Inquiry with identifying key issues that will be addressed in greater depth in Module 2 of the Inquiry (as well as other modules). It addresses a range of issues but is not intended to be a complete account of all advice that was given, meetings that took place, or other developments that occurred between early January 2020 to February 2022. This statement has been produced with the assistance of a team within OCMO and so the statement covers areas beyond my direct involvement, including areas in which the Deputy CMOs ("DCMOs") had a leading role; for several issues I have relied on records and will address issues of which I did not have first-hand experience.

1.4. To assist the Inquiry, I have quoted from some of the documents exhibited to this statement. Quoted text is shown in italics. In a few instances, quoted text is followed by an explanation shown as regular text in square brackets.

Section 2: My Background

2.1. I am Chief Medical Officer for England and Chief Medical Adviser to the UK Government, a post I assumed in October 2019. For much of the early pandemic (to August 2021) I was also Chief Scientific Adviser ("CSA") to the Department of Health and Social Care ("DHSC") and head (chief executive officer) of the National Institute for Health Research ("NIHR"), a role I had held since 2016 and passed on in August 2021. I am chair of the UK Vaccines Network ("UKVN"), a role I have held since 2015 when UKVN was established. I am an NHS consultant physician in infectious diseases at University College London Hospitals ("UCLH") and the Hospital for Tropical Diseases where I have been a consultant since 2001; prior to becoming CMO I was also consultant physician in acute medicine at UCLH from 2001. I am on the GMC specialist register for infectious and tropical diseases.

2.2. I am an epidemiologist and physician specialising in infectious diseases. I have a medical degree, a doctorate in science (DSc) in infectious diseases and a degree in physiological science from the University of Oxford; MSc in epidemiology from the University of London and other relevant qualifications. I am a Fellow of the Royal College of Physicians, Fellow (and Hon. Fellow) of the Faculty of Public Health, Fellow of the Royal Society, Fellow of the Academy of Medical Sciences, and Hon. Fellow of the Royal College of Paediatrics and Child Health, Royal College of Pathologists, Royal College of General Practitioners, Royal College of Physicians and Surgeons of Glasgow, Faculty of Pharmaceutical Medicine and other learned bodies.

2.3. Prior to becoming CMO, among other roles, I was Professor of Public and International Health at the London School of Hygiene & Tropical Medicine, a position to which I was appointed in 2006 and from which I was seconded into Government from 2009 to 2019. I was interim Government Chief Scientific Adviser ("GCSA") and head of the Government Office for Science ("GO-Science") from 2017 to 2018 (held concurrently with CSA in DHSC) and CSA to the Department for International Development from 2009 to 2015. When not in Government I chaired the independent National Expert Panel on New and Emerging Infections, the Advisory Committee on Dangerous Pathogens ("ACDP") and served on other scientific advisory committees to the UK Government and the World Health Organization ("WHO"). I was an honorary consultant epidemiologist for Public Health England ("PHE"). I was involved in the response to several previous emergencies, including the HIV pandemic (as clinician and researcher in Africa and UK), the Ebola epidemic of 2014, the H1N1 influenza

pandemic of 2009, the Novichok poisonings in 2018 (chairing SAGE), Zika in 2016 (co-chairing SAGE). I worked as a doctor and epidemiologist in Africa and Asia as well as the UK.

Section 3: Glossary of Terms

3.1. In this statement I refer to a number of acronyms, committees and groups which it may be helpful to summarise at the beginning so that they can be easily understood when reading this statement in isolation:

- CDC: The Centers for Disease Control and Prevention in the United States.
- COBR: The Cabinet Office Briefing Rooms is the term used to describe the Civil Contingencies Committee convened to coordinate the response of Government Departments and other agencies in times of national emergency.
- CSA: Chief Scientific Adviser to a Government Department. CSAs provide independent scientific advice to their main Department, and individually and collectively give scientific advice across Government in their specialist areas.
- DCMO: Deputy Chief Medical Officer.
- DPH: Director of Public Health. Based in local authorities these are the lead public health officials in the authority, providing public health advice to local leaders and the public in their locality.
- GCSA: This is the Government Chief Scientific Adviser. The GCSA is responsible for providing scientific advice to the Prime Minister and members of the Cabinet, advising the government on aspects of science for policy and ensuring and improving the quality and use of scientific evidence and advice in government. The GCSA is a permanent secretary level post, reporting to the Cabinet Secretary, and is supported by GO Science.
- GO-Science: An office of BEIS, GO Science is responsible for: giving scientific advice to the Prime Minister and when required Cabinet committees; ensuring and improving the quality and use of scientific evidence and advice in government; providing scientific advice in the case of emergencies, through their secretariat role with SAGE; helping the independent Council for Science and Technology provide high level advice to the Prime Minister; supporting strategic long term thinking in government through Futures and Foresight; and developing the Government Science and Engineering profession.

- JCVI: This is the Joint Committee on Vaccination and Immunisation. It is an independent committee and a statutory body with a statutory and advisory role to advise the Secretary of State for Health and Social Care on the provision of vaccination and immunisation services being facilities for the prevention of illness.
- NERVTAG: This is the New and Emerging Respiratory Virus Threats Advisory Group. It is a standing committee of DHSC. It advises the Government on the threat posed by new and emerging respiratory viruses.
- NIHR: National Institute for Health Research (the National Institute for Health and Social Care Research since April 2022). The main Government funder of applied research in health and social care.
- PHE: Public Health England. The forerunner to UKHSA on health protection. PHE also had responsibility for health improvement (primarily non-communicable diseases). The functions of PHE were separated in 2021, when UKHSA and the Office for Health Improvement and Disparities (OHID) were established.
- PHEIC: A Public Health Emergency of International Concern. The WHO decide whether to declare a PHEIC based on whether an extraordinary event is determined to constitute a public health risk to other States through the international spread of disease and to potentially require a coordinated international response. Most PHEICs are not pandemics.
- RWCS: Reasonable Worst Case Scenario. Scenarios are widely used in emergency planning. The RWCS is the reasonable worst case assuming countermeasures are either not available, prove ineffective, or are not used. It is assumed that if effective countermeasures are used the outcome will be better than RWCS. Such scenarios are not intended to be predictions.
- SAGE: This is the Scientific Advisory Group for Emergencies. SAGE is an independent advisory group, convened to provide scientific advice to support decision-making in COBR in the event of a national emergency.
- SPI-B: The Independent Scientific Pandemic Insights Group on Behaviours provides behavioural science advice aimed at anticipating and helping people adhere to interventions that are recommended by medical or epidemiological experts.

- SPI-M and SPI-M-O: The Scientific Pandemic Infections Group on Modelling and Scientific Pandemic Infections Group on Modelling, Operational subgroup are two groups of modellers who advise government. Their membership is drawn from academia and the government service. SPI-M operates in a non-emergency situation while SPI-M-O is stood up in an emergency and can become a sub-group of SAGE.
- UKHSA: UK Health Security Agency. Established in April 2021 and formally operationally from October 2021 UKHSA leads on health protection (infections and emergencies in the main) for the UK.
- UKRI: UK Research and Innovation. The umbrella body of the seven Research Councils, including the Medical Research Council (MRC).
- WHO: World Health Organization.

Section 4: The role of the OCMO

4.1. As CMO for England, I act as the UK Government's principal medical adviser. I am also the professional head of the public health profession and the medical profession in Government in England. I provide public health and clinical advice to Ministers in DHSC, to the Prime Minister, Ministers and senior officials across Government (restricted to England where responsibility is a devolved power). Responsibility for health is largely a devolved matter so Scotland, Wales and Northern Ireland have their own CMOs.

4.2. The CMO is a professionally independent position at Permanent Secretary level. Since the position was first established in 1855, the CMO has always had an advisory role in Government, a leadership role for the public health and medical professions, a public-facing role to inform the public of health issues and a scientific role. The professionally independent nature of the position and that of the DCMOs is demonstrated by the fact that the CMO can write reports and make public statements which do not accord with Government policy when relevant to public health. I sit on the Executive Committee and the Board of the Department of Health and Social Care. The CMO currently reports to the DHSC Permanent Secretary.

4.3. The DCMOs support the CMO but, as senior medical advisers, can also act on their own behalf. The DCMOs provide advice as senior clinical or public health experts in their own right. Usually, there is a principal DCMO for health improvement (mainly

focused on non-communicable diseases such as cancer and heart disease) and one for health protection (e.g. infectious diseases and other emergencies). During most of the pandemic (and so the period of interest in Module 2), all the DCMOs in post worked, at least in part, on health protection as part of the COVID-19 response.

4.4. I was appointed CMO on 1st October 2019 and therefore held the post throughout the period considered by Module 2. I remain in post. Three full-time DCMOs were in post during the pandemic. Professor Sir Jonathan Van-Tam took on the role of DCMO for health protection in 2017 and relinquished it upon taking up a senior position in academia in March 2022. Professor Dame Jenny Harries became DCMO for health improvement in 2019 and continued in that role until taking up the position of CEO of the UK Health Security Agency ("UKHSA") in April 2021. Dr Thomas Waite was appointed as an interim DCMO covering COVID-19 in July 2021. He subsequently succeeded Professor Van-Tam as DCMO for health protection and remains in post. In addition, Dr Aidan Fowler, whose main role is as the National Director of Patient Safety in NHS England, was also a DCMO covering some relevant areas on COVID-19 for a part of the period being considered in Module 2.

4.5. Collectively, the DCMOs and I are supported by a single private office (a small team that support senior civil servants or Ministers). Two senior private secretaries (Grade 7) led this team and were responsible for ensuring that we were supported in our roles; the senior private secretaries led on science and policy respectively. In addition to the traditional make up of a private office (private secretaries and diary managers) the team includes public health speciality registrars - trainees in public health - who edit the annual reports issued by the OCMO and provide additional clinical and public health input if appropriate. At its largest size the OCMO was 19 people, including the CMO and DCMOs; its current size is 13.

Section 5: The role of the OCMO during the COVID-19 pandemic

5.1. As the UK Government's principal medical adviser I, together with my deputies and private office, played a significant and often public role in the response to COVID-19.

5.2. The first instance of what became known as COVID-19 was notified to WHO on 31st December 2019. Very little was known about the pathogen at that time.

5.3. On 2nd January 2020 I was made aware of cases of "pneumonia of unknown aetiology" detected in Wuhan. From that point, our team was involved in providing advice on clinical, scientific and public health issues to Government and continued to do so

throughout the pandemic. By necessity, much of the advice we provided was reactive with requests coming from a wide array of policy teams, and Ministerial offices across Government into what was throughout a small team.

5.4. Over the pandemic, OCMO provided a considerable amount of advice. This ranged from strategic advice on critical matters through tactical advice to technical "tweaks" to proposed language to ensure accuracy. Whatever advice was given it had a common purpose: to assist Ministers, other policymakers, clinicians, public health officials, scientists and the public in making informed decisions.

5.5. As the challenges of the pandemic altered so did the role of the OCMO. At the beginning of the outbreak the OCMO carried out an investigative and monitoring function, while planning for an escalation of risk. This evolved into a wider health and science advisory role as the likelihood of the outbreak having a global impact increased and Government response intensified. As the response to the outbreak became a cross-Government priority more formal structures were adopted e.g. COVID-O, which again altered the nature of the OCMO role.

5.6. Throughout the pandemic, the CMOs of the four UK nations met and discussed regularly to ensure coordinated public health advice was provided to Ministers across the UK and to share and test thinking.

5.7. In addition to my advisory role within Government I was, and continue to be, responsible for providing public health leadership to the public health profession in England, meeting regularly with the Directors of Public Health across the country. I was, and remain, part of the collective leadership of the medical profession, for example meeting regularly with the Presidents and/or Chairs of the Medical Royal Colleges and the National Medical Director of the NHS.

5.8. As noted above I was concurrently the CSA to DHSC and Head of NIHR, from October 2019 to August 2021 (in August 2021 this role was taken over by Professor Lucy Chappell). The DCMOs and I were involved in co-ordinating research relevant to COVID-19 throughout the period relevant to this Module. Whilst the CMO and CSA roles are advisory the head of NIHR role is often decision-making on research priorities; I anticipate this element will be considered more fully in later Modules.

Hierarchy of advice on COVID-19

5.9. Before the OCMO can give advice to Ministers and the public there is, when time allows, ideally a process of information sharing and gathering views across the spectrum of clinical and scientific opinion. Although the CMO and DCMOs are finally responsible for the advice we give it is most useful to Ministers if that advice is informed by a legitimate spectrum of opinion of technical experts. Advice can be updated and change over time as more is learnt and the science moves on, and the virus evolves. With that being said, there was significant uncertainty about this new pathogen, especially early in the pandemic, which sometimes inevitably resulted in a wide range of views within the academic community.

5.10. In the early stages of the pandemic multiple scientific groups and individuals met to try to form a view on possible scenarios arising out of the emergence of the new pathogen and their likelihood. This included specialist scientific groups in the UK and international groups, including the WHO.

5.11. There was significant scientific activity, both formal and informal, from the time the WHO passed on the notification of an outbreak made to them on the 31st December 2019. As the probability that COVID-19 would have global impact increased, Government activity was escalated to communicating, including via meetings, with senior health policy officials, then health Ministers, and then wider Government including Cabinet Office, 10 Downing Street, Cabinet, Parliamentarians and the wider public.

5.12. In late January 2020 the SAGE system was activated; this provided a formal forum for combining scientific expertise from multiple strands to provide a unified view. A series of specialist scientific committees (some already in existence and others set up especially) then took scientific outputs from many thousands of scientists in the UK and internationally to form a central view in their area of expertise. The agreed committee views were then fed into SAGE, which was constituted to bring together scientists from multiple disciplines and chaired by the GCSA, then Sir Patrick Vallance FRS, and co-chaired by me as CMO because of the nature of the emergency. The product of SAGE's work then formed the basis of advice to Ministers and Cabinet given both through minutes of SAGE meetings, which are the definitive record of SAGE advice, and from me as CMO, the GCSA, the DCMOs and others. I consider the minutes of SAGE, which are prepared by GO-Science and available publicly, to be of

central importance to understanding the scientific advice, and therefore of interest to this Inquiry.

5.13. SAGE advice, whether via written minutes or through the SAGE co-Chairs, was available when making cross-Government decisions. Observers from Government departments, including Cabinet Office, were present at SAGE meetings and aware of SAGE advice and the background which informed them. As the organisation that provides the secretariat, a full description of SAGE and its sub-committees can be provided by GO-Science and the GCSA.

5.14. Some scientific issues relevant to the health system but not wider Government did not go through the SAGE system. OCMO advice on, for example, the order of vaccination or the role of specialist laboratories, was given based on the advice of specialist committees such as JCVI or ACDP.

5.15. Some issues were either too urgent, or too narrow or specific, to go through a specialist committee structure. In these cases, OCMO gave advice based on our own expert judgement, either alone or after seeking informal advice from other CMOs or experts.

5.16. The hierarchy of advice was therefore:

- Where the request required technical advice on a point of detail or was very time-sensitive then advice would come from the CMO or DCMOs either individually or collectively. This was often after obtaining informal advice from experts in the field, including sometimes a discussion with the Chair of a specialist committee, if required and practical, and informed by SAGE central views, or medical and public health principles. At points in the pandemic, multiple requests for advice from OCMO were coming in every hour.
- To ensure a range of expertise and challenge, advice on larger issues with wider impact but relevant only to health would wherever possible be given on the basis of advice from specialist medical advisory committees, either pre-existing or established for the pandemic.
- Advice that was required for Cabinet, Cabinet sub-committees, Cabinet Office or cross Government decisions would be informed by SAGE where possible, which in turn was informed by formal independent and Government scientific committees such as SPI-M, NERVTAG, SPI-B. It is important to note that the advice of the subcommittees was in turn informed by a very major national and international scientific effort. The GCSA and I were usually both present at major 10 Downing

Street/Cabinet Office decision-making meetings and provided joint scientific advice based on the outputs of SAGE.

5.17. Given the volume of requests, the DCMOs independently provided advice across a wide range of clinical, scientific and public health issues. There was some degree of specialisation by the DCMOs when time allowed. These divisions were, however, never absolute. As CMO I had and have overall responsibility across all areas covered by OCMO.

5.18. Professor Van-Tam, who has a background working with the pharmaceutical industry was leading on drugs and vaccines and had the lead interactions with NERVTAG (of which he had been Chair before joining Government) and JCVI. We anticipate the work on developing drugs and vaccines will be considered in detail in a subsequent module of the Inquiry.

5.19. Professor Harries, who had many years of experience as a Director of Public Health, worked particularly on local government issues (which includes DPHs and education). As DCMO, Professor Harries chaired the SAGE Social Care Working Group. She advised on adult social care, travel, shielding, local authorities, education and higher and further education. It is anticipated these topics may be considered in more detail in later focused workstreams of the Inquiry.

5.20. It is important to be clear that in this pandemic, as in almost all science, evidence accumulated incrementally and the midpoint of scientific thinking therefore moved incrementally over many topics. Although policy decisions are often binary, and therefore occur on a certain date, the balance of scientific advice usually moves continuously as evidence accumulates. Especially early in the pandemic there was wide uncertainty around central estimates, which got narrower as the evidence accumulated. In some areas the balance of scientific opinion moved, as for example on the relative contribution of asymptomatic transmission or the utility of facemasks, but these were usually gradual processes involving emerging data and technical debate and seldom the result of a single study or insight. In many other areas the central view remained relatively static, but the spread of uncertainty around that narrowed over time with more data. For many key areas there were valid outlier opinions to either side of the central view. A similar point is likely to be made by DHSC witness statements from a policy perspective. The issue of accumulation of evidence in multiple aspects of this pandemic is covered much more fully in the Technical Report

of the CMOs and GCSA. Detail explaining this document's purpose can be found below.

5.21. Together with the GCSA, and the CMOs and lead DCMOs of Scotland, Wales and Northern Ireland we have summarised many of the key scientific challenges brought up by the COVID-19 pandemic in the UK in a report to our successors, which was published on 1st December 2022 ('the Technical Report") **(CJMW/001 – INQ000203933)**. Although it is written for a narrow and specific audience (future CMOs, GCSAs, National Medical Directors and UK public health leaders facing a pandemic or major epidemic) and is therefore inevitably technical, several of the questions raised by the Inquiry in their request to the OCMO are addressed in that report, which is publicly available. It includes many of the lessons we learned and consider important to pass on to our successors.

Advice within the Department of Health and Social Care

5.22. As well as advising central decision makers (10 Downing Street and Cabinet Office), the OCMO also provided advice to the Secretary of State for Health and Social Care, DHSC Ministers and DHSC officials on public health, science or clinical matters as required. This included advice that was collated by DHSC teams and passed to other Departments or to central teams such as the Cabinet Office.

5.23. As DHSC is both the home Department for OCMO and the lead Department for much of the COVID-19 response there was a very large amount of interaction between DHSC and OCMO. For instance, my calendar indicates that I met formally with the Secretary of State for the Department of Health and Social Care around 233 times in the relevant time period, not including multiple Cabinet Office or 10 Downing Street meetings where we were both present.

5.24. The OCMO worked to provide scientific and clinical advice within the process(es) and structures established by the DHSC. OCMO was not responsible for setting up those processes and structures and so DHSC is best placed to offer information the Inquiry may require on how they were intended to work or if they worked as intended. The DHSC is best placed to lay out the mechanism by which the Department, its senior policy officials and Ministers received advice. As laid out above, as CMO I had, and have, a formal role in the DHSC structure, sitting on its executive committee (ExCo) and its Board, including to provide clinical and scientific input.

5.25. From 20th January 2020 the Permanent Secretary (Sir Christopher Wormald) led a series of meetings. These were superseded by meetings chaired by the Secretary of State for Health and Social Care. I or DCMOs (often both CMO and DCMOs) attended most of these meetings, which, along with written advice usually provided via emails, were the predominant route by which OCMO advice fed into the decision making in the Department.

Advice to the centre - Cabinet Office and 10 Downing Street

Process

5.26. The OCMO worked within the process(es) and structure of the provision of information, advice and analysis to central decision makers; the Prime Minister, 10 Downing Street, Cabinet, Cabinet and Ministerial Committees and individual Secretaries of State. From a cross-Government coordination perspective the Cabinet Office was and remains responsible for those processes and structures used for the provision of advice between January 2020 and February 2022 and is best placed to explain those processes and structures.

5.27. I and/or DCMOs were invited to many, but not all, Ministerial meetings held as part of the COVID-19 response, including those with or chaired by the Prime Minister, such as Cabinet and COBR, usually with the GCSA with whom I worked very closely throughout the period of this Module. The GCSA and I were invited to provide clinical and scientific information and/or advice to inform Ministerial discussions, wherever possible relying on the advice of SAGE.

5.28. OCMO, particularly the DCMOs, had considerable involvement in meetings held with other Government Departments at various points in the time period under consideration. To give two examples there were meetings with the Department for Education on schools and with the Department for Culture, Media and Sport on sporting events.

5.29. OCMO advice was additionally provided directly to central decision makers and to Government Departments both in written and oral form, again wherever possible relying on SAGE or expert committee advice, as explained above.

5.30. OCMO advice was also relayed through others, for instance advice was provided to DHSC policy teams, who incorporated it into their own advice and recommendations to the Cabinet Office, noting that this was often written by non-specialists. Where

OCMO advice was provided orally in meetings it should be recorded in the minutes of those meetings, if minutes were prepared. Responsibility for taking minutes did not usually lie with the OCMO, nor were we normally requested to clear minutes and in many cases did not see them. The convention is that minutes are usually taken by the private office of the most senior person present. Thus, for instance, meetings with the Prime Minister or other Ministers should have been and should be minuted by their private offices. In that respect any minutes record the minute taker's understanding of any OCMO advice provided.

5.31. Most of the key decisions taken during the pandemic by 10 Downing Street and the wider Government had multiple serious implications outside health, including social and economic. The scientific and health advice was therefore, properly, only part of the technical and wider advice Ministers received before coming to decisions. The function of OCMO (and of scientists and other health professionals in Government) was therefore to provide the health and science advice and interpretation of data, but to expect that Ministers would take that information as only one of the factors to be taken into account in decision-making, albeit often an important one.

Initial advice on threat of COVID-19 to the UK

5.32. It may be helpful to lay out some background on pandemics and major epidemics in brief, although I understand that this will be covered more fully in Module 1. Because pandemics are rare, historical experience is important and helped inform initial technical views.

5.33. Multiple significant new human and zoonotic (i.e. capable of transfer from animals to humans) infectious outbreaks occur globally every month. Major epidemics of regional (multi-country) significance occur every few years (for example Ebola in West Africa in 2014-16 **(CJMW/002 – INQ000203932)** and Zika in Brazil in 2015). Most only cause spillover cases in the UK.

5.34. Pandemics are however rare. The pandemics of medical importance to the UK over the last century prior to COVID-19 were H1N1 influenza (1918), influenza H2N2 (1957), influenza H3N2 (Hong Kong 1968), HIV from the early 1980s, H1N1 swine 'flu (2009).

5.35. HIV was the last pandemic of a scale similar to COVID-19; it was a sexually and intravenously transmitted pandemic predominantly restricted to young adults, which

emerged globally in the 1980s (although with a longer history) for which we still do not have an effective vaccine but for which effective drugs were developed over a number of years.

5.36. The last respiratory pandemic on the scale of COVID-19 was the H1N1 influenza pandemic of 1918-19- so a century before.

5.37. H1N1 influenza (2009) was the last pandemic affecting the UK. It was declared a Public Health Emergency of International Concern (PHEIC) by WHO on 25th April 2009, and a pandemic on 11th June 2009. In the UK official estimates are that 795,000 people were infected, and 457 people died. WHO reported that as of 1 August 2010, worldwide more than 214 countries and overseas territories or communities had reported laboratory confirmed cases of pandemic influenza H1N1 2009, including over 18,449 deaths. The scale of its impact on mortality and society was therefore relatively limited compared to other pandemics.

5.38. The major outbreaks of the coronaviruses SARS (Severe Acute Respiratory Syndrome) (first reported to WHO 2003) and MERS (Middle East Respiratory Syndrome) (first known case 2012) led to 4 and 5 proven cases respectively in the UK **(CJMW/003 – INQ000203929, CJMW/004 – INQ000203934 CJMW/005 – INQ000203928)**. Globally, during the main period of these outbreaks there were 8,098 reported cases of SARS and 774 deaths. The disease has a case fatality rate of between 3-10% depending on the method by which it is calculated, including in younger adults. For MERS as of 16th June 2022 WHO report 2,591 cases (with the latest in 2022) with 894 deaths. The mortality rate for people with MERS reported to the WHO is approximately 35%.

Overview timeline

5.39. I set out below a timeline identifying significant activities in which OCMO was involved during the period of interest to Module 2. The activities described phased into one another so the dates are indicative and a lot of work occurred in parallel. The timeline only addresses those activities which, from OCMO's perspective, were particularly significant. There was considerable detailed technical advice provided by OCMO throughout. Over the same time, other important issues, which OCMO was less central to in terms of providing advice (but where it sometimes contributed) arose.

5.40. In the initial 3 weeks of 2020 running up to 21st January, the principal work being undertaken was to determine whether this outbreak in China could be a threat to the UK. SAGE had not yet met, and the assessment and advice of PHE and the OCMO and the committees informing them, especially NERVTAG, was therefore central to Government activity. I therefore lay it out in more detail below.

5.41. Once our, and the international, assessment was that the risk of COVID-19 becoming a global threat had increased SAGE was activated. Substantial work was undertaken to inform wider Government of the potential risk and initial assessments were made of key parameters, such as mortality and incubation period. This covers the period 22nd January to around 6th February 2020 and again I give more detail below, as OCMO advice, rather than SAGE advice, was still often being sought or used over this timeframe although our advice was strongly informed by SAGE's initial views.

5.42. Until 6th February there had been 2 UK cases (both Chinese nationals) and no UK deaths with 564 deaths reported in China **(CJMW/006 – INQ000203935)**.

5.43. From 6th February until around 4th March, DHSC and Cabinet Office among others undertook initial policy planning addressing potential responses if a pandemic occurred. SAGE and OCMO provided scientific and clinical advice to inform this planning. I expect this policy planning will be set out in some detail in the witness statements from DHSC and Cabinet Office and so I do not cover it here. Scientific research which subsequently provided drugs, vaccines and clinical information which underpinned the steady move to medical countermeasures from later 2020 was initiated in this period. I was involved in devising the "Contain, delay, research, mitigate" framing for these potential responses, which is outlined in the Government's action plan published 3rd March 2020 **(CJMW/007 – INQ000087573)**.

5.44. Until 4th March there were 85 reported UK cases and 0 reported UK deaths (**CJMW/008 – INQ000203876)**.

5.45. During the period from 5th March to when the Prime Minister announced the initial stay-at-home advice (16th March) there was a rapid escalation of activity, with decision making now led out of 10 Downing Street and Cabinet Office. SAGE was now providing the central scientific view to inform Government decision making.

5.46. As of 16th March, there were 1,544 UK cases and 55 UK deaths reported (an initial 35 deaths were confirmed and reported at the time of the daily sitrep and 20 additional deaths were reported subsequently) **(CJMW/009 – INQ000203882)**. It is important to

note that the case numbers were (and were thought at the time to be) an underestimate. I cover this more fully below.

5.47. From 17th March and through to subsequent school closures (20th March) and the first full lockdown (23rd March) decisions were informed principally by scientific advice from SAGE, communicated via minutes, or jointly by GCSA and me. The DCMOs and I were also involved in communicating clinical and scientific information to the public, including via nationally televised daily press conferences.

5.48. By 23rd March there were 6,650 UK cases and 335 UK deaths reported **(CJMW/010 – INQ000203892)**.

5.49. Following on from the escalating restrictions imposed by Ministers (16th to 23rd March), from 23rd March (first lockdown) to when we were confident we were past the peak of the first wave of the pandemic in late April (the Prime Minister announced we were past the peak on 30th April **(CJMW/011 – INQ000203930)**), much of the activity was in assessing whether the force of transmission was falling, and activities to help ensure the NHS was able to cope as best as possible with the peak of the wave, the size of which was not clear until after the peak was passed. There was also a lot of communication via the media which was intended to ensure the public were informed of the science behind the pandemic, understood the reasons for lockdown and could see progress or lack of it.

5.50. From the peak of the first wave until the autumn of 2020 there was debate within Government over the speed and sequencing of unlocking, and the risks and benefits attendant on that, which SAGE scientific advice informed. It was the view of most scientists, SAGE and the OCMO that a further wave over the winter if not before with attendant direct and indirect mortality was almost inevitable.

5.51. From autumn 2020 as cases started to rise until the spread of the new Alpha variant of COVID-19, first described in southern England, in late December 2020 three matters dominated thinking; a debate about the effectiveness of local rather than national lockdowns and whether they should be imposed at all; the good news that a vaccine had proved successful, meaning a way out of the pandemic was likely in due course as the vaccine was deployed; and the first results of clinical trials of drugs and other clinical innovations led to a reduction in case fatality (but it was still significant). The availability of widespread population COVID-19 testing gave rise to new control options, based on existing test, trace and isolate principles.

5.52. From the emergence of the Alpha variant at the end of 2020 to the end of the main Alpha wave in February 2021, when it was overtaken by a variant with greater transmissibility (Delta) the focus of activity was on trying to provide technical advice to minimise mortality via a lockdown which both reduced the impact of the new variant but was also less disruptive to the NHS, education, wider society and in social care than in the first wave. Deploying the first vaccines in a way which would maximise uptake and impact was a significant scientific discussion, with JCVI and OCMO leading the scientific assessment.

5.53. The next period was the Delta waves from February 2021. First described in India this even more transmissible variant travelled globally and was imported into the UK. This led to attendant discussions on how to address imported variants of higher transmissibility and vaccine escape potential.

5.54. The arrival of Omicron, an even more transmissible variant first described from southern Africa and which spread globally and was imported into the UK, from late 2021 through early 2022 gave rise to debates on the likely impact on the NHS, and on disease severity in a population vaccinated against a prior variant. Advice from South African scientists was central to these scientific debates.

Themes emerging from the overview timeline

5.55. Inevitably the science was least clear in the early months of the pandemic. Little was known with confidence about the virus, testing was very limited and clinical data were sparse, there were no tested drugs or vaccines and the non-pharmaceutical countermeasures had not been used at this scale in living memory in the UK, and in the case of full lockdown had not been used at all. Several key features of the clinical infection such as the prolonged symptoms collectively known as Long Covid had not been identified. Advice at this stage often had to be based on public health principles and extrapolation (from influenza, MERS, SARS) with wide uncertainty. By mid-2020 the growth in scientific knowledge, both domestically and internationally, and the expansion of testing and data nationally allowed for far more targeted scientific advice (although there were still many unknowns, especially when major new variants emerged). By the end of 2020, evidence of the effectiveness of medical countermeasures was beginning to emerge due to the findings of research initiated at the start of the pandemic in the UK and internationally and these gradually took over from non-pharmaceutical measures as the principal control measures.

Significant Activities – 1st January 2020 to 6th February 2020

5.56. I now set out in more detail some of the key issues in the period 1st January 2020 to 6th February 2020. During this period there was a steady progression of activity, initially led by DCMO Professor Van-Tam and NERVTAG with some input from me, then increasingly by me as CMO with support from Professor Van-Tam as the probability of the threat becoming global increased. By 7th February SAGE was fully operational, senior Ministers and the Prime Minister had been informed of the possible scale of any pandemic and cross-Government mechanisms were in place. The scientific advice on major decisions from there on was largely SAGE-led with SAGE minutes being the best source of the contemporaneous advice that was transmitted jointly by GCSA and me.

From 1st January 2020 to 21st January 2020

5.57. During this period, in addition to OCMO activity, PHE were also active in tracking the early outbreak and any UKHSA witness statements may well cover the work undertaken by PHE.

5.58. This period predates the WHO providing the summary of its first delegation to Wuhan on 22nd January 2020, declaring a Public Health Emergency of International Concern on 30th January 2020, or a pandemic on 11th March 2020. SAGE (technically pre-SAGE) first met on 22nd January 2022. PHE and the OCMO and devolved equivalents, informed by NERVTAG and others, were therefore the principal interpreters to Government of the UK risk of this new outbreak in China in the first 21 days of January 2020.

5.59. I have included the numbers of cases and deaths reported at the time to provide context (as I have above in the outline timeline). The case numbers will of course have been underestimates due to the limited testing then available in the UK and globally, and were known to be at the time, but were what we had to work with. Death numbers were thought to be much more accurate because the clinical syndrome led to clinicians suspecting COVID-19, and the limited testing available was prioritised for severe cases. Mortality rates and numbers in intensive care were however a backward-looking lagged indicator for infection in a rapidly doubling exponential growth curve. How this fed through to advice is laid out in SAGE minutes, and the issues of case ascertainment and testing and key technical points like difficulties in determining

infection fatality rates early in the pandemic are discussed below and in detail in the Technical Report.

5.60. During this initial period the OCMO was mainly involved in assessing the extent to which this new infection was a threat globally and therefore to the UK. There are multiple outbreaks globally every month, reported formally through WHO and/or informally through professional networks such as the website ProMed which alert physicians and public health specialists to assist with clinical management. Only a few of these become major epidemics and a fraction of those become a global threat. The initial assumption will always be that the probability of a major outbreak from any initial report is low, but the possibility is always there with an unknown pathogen. There are risks both to undercalling (missing the start of a major epidemic) and overcalling leading to multiple false alarms.

5.61. WHO was notified of an outbreak in China on 31st December 2019. The pathogen was unknown.

5.62. On 2nd January 2020 Professor Van-Tam as DCMO health protection emailed me, DHSC health protection policy and PHE colleagues and highlighted the outbreak **(CJMW/012 – INQ000183346)**:

> *ProMed is somewhat akin to a football transfers website (excitable in January) for ID folks but the highlighted article (Message 1) is I think one we should watch (no more than that) and see what WHO and CDC China have to say in due course. My US CDC contacts don't have any additional info at this stage. Maybe we can ask PHE (Gavin) to actively track this?*

5.63. On 2nd January Professor Van-Tam emailed international colleagues including WHO and CDC asking for further information **(CJMW/013 – INQ000183347)**:

> *Grateful for early heads up if WHO, US CDC in China or US Gov get more….*

5.64. On 3rd January Professor Van-Tam emailed Professor Sir Peter Horby (an academic colleague) to ask him to use his contacts in China to provide any intelligence on the outbreak **(CJMW/014 – INQ000151286)**:

> *Peter we are aware of this and are tracking. If you get whispers from your Chinese academic contacts please report in.*

5.65. On 5th January I laid out a series of triggers which, if met, would provide an indication that an epidemic of global importance was possible from the outbreak that had been described. These were **(CJMW/015 – INQ000047484)**:

> *1. Healthcare workers dying. This is often the early warning that a new infection is both severe and transmissible (eg SARS, MERS, Ebola). This would be the most concerning.*
>
> *2. Evidence of person-to-person spread eg in families.*
>
> *3. Geographical spread implying a zoonosis is spreading (in this case we would also want to liaise with DEFRA).*

Much of the next 2 weeks were spent trying to ascertain if the triggers were met.

5.66. On 5th January the WHO reported that 44 people were reported as having been infected with what was then still described as "pneumonia of unknown etiology". There were 0 reported deaths **(CJMW/016 – INQ000183374)**.

5.67. On 6th January Professor Van-Tam wrote to a colleague in the WHO to ask for further information on the outbreak **(CJMW/017 – INQ000151289)**:

> *Also tell me anything you can on the novel cluster in Wuhan please?*

5.68. On 6th January 2020 Professor Van-Tam wrote to a colleague at CDC to ask for any information they could share **(CJMW/018 – INQ000151291)**:

> *If you get anything by way of extra details (not on ProMed or IHR) that you can share please would you consider doing so?*
>
> *Immediate questions we have are:*
>
> *1. Does this still look point source?*
>
> *2. Any evidence of HCWs* [Health care workers] *affected?*
>
> *3. Any evidence of geographic creep?*
>
> *4. Any concerns about P2P transmission?*
>
> *5. Have good quality labs such as CDC/Erasmus got any specimens yet to work on?*

5.69. On 7th January I met with Sir Patrick Vallance, the GCSA. While the outbreak was not the purpose of the meeting, we discussed it.

5.70. On 8th January Professor Van-Tam shared informal information received from CDC colleagues with DHSC health protection policy colleagues that the outbreak in Wuhan might be a novel coronavirus **(CJMW/019 – INQ000151293)**:

> *I had picked up a whisper from CDC that it was thinking novel (non SARS, non MERS) coronavirus. Indeed this is what CMO (and me) felt was most likely. We will have to see if confirmed IDC* [in due course].

5.71. On 8th January Professor Van-Tam provided an update to CCS in the Cabinet Office **(CJMW/020 – INQ000151292)**.

5.72. On 9th January Professor Van-Tam wrote to a colleague in Singapore to ask for further information **(CJMW/021 – INQ000183348)**:

> *have you got a case in SG? I am hearing you might??*
>
> *What does it look like clinically? And* [sic] *info gratefully received. Do you have any data on age ranges in Wuhan etc.*

5.73. On 9th January 2020 Professor Van-Tam wrote to PHE to set out a consolidated view based on the information available on the outbreak so far **(CJMW/022 – INQ000151296)**:

> *My up to the minute take on things:*
>
> *1. Rumours are rarely incorrect in this space so as predicted we are heading towards a novel coronavirus; notably with zero reported case fatality so far, though 7 of 59 cases with severe disease is a significantly high 12% case-hospitalisation rate in my view such that established person to person transmission would cause serious hospital surge pressures on a par with a severe panflu virus.*
>
> *2.Our three triggers are not met at this point, implies no change to UK or global PH threat;*
>
> *3. The caveat is that inasmuch as two other novel coronaviruses have proven to be transmissible P2P predominantly in HC settings I do not rule out P2P transmission and case numbers in China have swelled from 27 when first reported to 59 now.*
>
> *4. My hunch is that likely the identification of the novel coronavirus has not been simple and that right now there will be no simple reliable diagnostic test available; it is possible that existing pan-coronavirus PCRs will pick it up OK*

and that MERS/SARS specific PCRs might cross react, but the latter is all a bit speculative.

5. Essentially if we or any other countries get cases we won't be in a position to diagnose by lab test in the next few weeks; more likely it will be resp infection + travel to Wuhan within last 21 days (we don't know incubation period) + no obvious common RVI cause. The caveat will still be that +ve for flu (and lots in China at present) would not in my view assure no co-infection with something novel.

6. Ben Cowling in HK tells me that they absolutely expect cases (even in the absence of P2P transmission) and the possible case in South Korea is a similar case in point.

UK implications:

1. Just because we may have a tentative novel organism identified (disclosed) by the end of the day simply gives us more info but does not materially change any global or UK PH risks

2. Cabinet Office and likely Ministers will be sensitive to imported cases because there is a direct flight to Wuhan once every 2-3 weeks. In reality most returnees will route via Seoul or Beijing methinks.

But right now all we could do, if we do anything, is identify cases of ARI (possibly limited to hospital though we will miss a lot this way) with a recent 21d travel history to Wuhan. Take appropriate specimens for routine RVIs and stores samples and serum for when there is a decent test available. Maybe Maria [Zambon, PHE] *has a pan-corona test she can use now??*

5.74. On 9th January Professor Van-Tam emailed PHE to ask about what category of Biosafety Level the pathogen would be treated as **(CJMW/023 – INQ000183349)**.

5.75. On 9th January I requested NERVTAG meet the following Monday, 13th January, in particular to consider port of entry screening **(CJMW/024 – INQ000047488)**.

5.76. On 10th January Professor Van-Tam wrote to the Civil Contingency Secretariat ("CCS") in the Cabinet Office **(CJMW/025 – INQ000151308)**:

1. This is a coronavirus

2. Colindale [PHE] *has a pan-coronavirus assay it can use now (I do not know how cumbersome, rapid or automated this is – but there may well be very finite*

capacity limits). The other test-performance limitations are that: a) this should essentially give a yes/no answer for any coronavirus. The test will be positive for 'normal' coronaviruses of the type that can be the cause of the common cold. Equally should be positive for SARS and MERS. Should in theory also be positive for the novel coronavirus but we will simply not know the performance of that test against the novel virus (if it is reliable or not in the new application) until we have specimens or sequences against which the test can be validated. Thus right now a positive test might mean something (but might indicate a common cold); a negative test would not be entirely reassuring only somewhat reassuring.

3. The specific assays for MERS and SARS that UK has we can assume do not work for the novel coronavirus or cross-react. The reason is the Chinese were able to conclusively exclude MERS and SARS on the basis of having access to specific MERS and SARS tests.

4. Work on perfecting an assay specific to the novel virus will take weeks not days, but maybe not very many weeks. No-one can begin this assay development work to any great extent anywhere in the world until there is access to specimens and/or genetic sequencing data. There is an ongoing WHO call as we speak but I have not heard yet that any specimens have been shared by China.

5. My opposite number in Singapore (DCMO equiv) confirms that they are in exactly the same place as the UK in terms of current diagnostics

5.77. On 11th January there were news reports of the first reported death globally **(CJMW/026 – INQ000183350)**.

5.78. On 13th January the first case outside China was reported. This first confirmed case was in Thailand. Professor Van-Tam wrote to CCS to make them aware **(CJMW/027 – INQ000151313)**.

5.79. On 13th January Professor Van-Tam attended the first meeting of NERVTAG. He subsequently wrote to CCS **(CJMW/028 – INQ000151311)**:

My observations below come with all the requisite 'health warnings' about the dangers of interpreting officials' views of meetings in advance of the formally approved minutes.

But hope helpful to clarify:

1. NERVTAG briefed and watching closely; remain cautious that it is too early to rule out all person to person Tmx [transmission] *but it so far looks very low or absent*

*2. NERVTAG endorses extant advice to HMG that port of entry screening is not likely to be effective nor a good use of resources.**

3. NERVTAG supports PHE risk assessment and approaches to date.

4. During the call, case in Thailand confirmed by sequencing (sequences have now been released at least in part) – this is a Chines [sic] *national visiting Thailand (who's symptomatic but not poorly). No contact with implicated market in Wuhan raising unresolved questions. Rather a long interval from date of onset of first case (06DEC19) and latest Thai case (05JAN2020).*

It remains very much a watch (closely) and wait situation.

**To note, NERVTAG aware that the Thai case was picked up by airport thermal screening but this does not change its view that screening will be highly inefficient and is not advised.*

5.80. On 13th January Professor Van-Tam suggested the pathogen should be seen as an airborne HCID (High Consequence Infectious Disease) **(CJMW/029 – INQ000151309)**.

5.81. On 15th January Professor Van-Tam wrote to colleagues at the WHO requesting further information if possible **(CJMW/030 – INQ000183351)**:

Our modellers and UK Gov advisory experts are desperate for the demographics and epi curves from Wuhan.

Anything you can share please?

5.82. On 15th January 43 people were reported as infected. There was 1 reported death. The numbers for China had been revised down from 44 to 41. There was 1 case in Thailand announced on 13th January and 1 confirmed case in Japan on 16th January **(CJMW/031 – INQ000183375, CJMW/032 – INQ000183385, CJMW/033 – INQ000183376)**.

5.83. On 16th January Professor Neil Ferguson (an expert academic infectious disease modeller) wrote to me and Professor Van-Tam estimating that based on two exported cases in Japan and Thailand the 40-50 cases reported to date were unlikely to be

accurate and that his central estimate was 1149 cases by 6th January **(CJMW/034 – INQ000183353, CJMW/035 – INQ000183386)**.

5.84. On 17th January Professor Van-Tam attended a WHO meeting on COVID-19 **(CJMW/036 – INQ000183354, CJMW/037 – INQ000183352)**.

5.85. On 17th January Professor Van-Tam set out advice on port health recommendations to DHSC health protection and PHE colleagues **(CJMW/038 – INQ000151331)**: (Professor Van-Tam's text is shown in red and underlined below, policy colleagues text in shown in black) :

> *Thank you very much for sharing IMT and SRG recommendations on port health. The CMO and DCMO have now considered these and their feedback follows in red:*
>
> *Rec 1 - For direct flights between Wuhan and Heathrow, implement an announcement during the flight asking passengers to report symptoms to cabin crew combined with the requirement for a General Aviation Declaration (radioed by the pilot to the airport prior to landing) that there is nobody unwell on the aircraft. If an individual is declared unwell, the flight will be dealt with according to existing operational plans.*
>
> *This is NOT supported. NERVTAG has not recommended entry screening and this recommendation would, in effect, be self-reported entry screening for symptoms that might identify some NCoV19 cases but also lots of other things. Also, some passengers might hide symptoms for fear of consequences. If the aircrew detect a clearly unwell passenger its BAU for them to issue a GAD.*
>
> *Rec 2 - For terminals receiving direct flights (i.e. at London Heathrow), ensure isolation capability is available for the immediate management of suspected cases*
>
> *This is appropriate for interception and safe management of people who self-report having seen arrival no (tices (see below i.e. if used) and/or who are picked out by aircrew or customs as looking very ill in some way which would be BAU.*
>
> *Rec 3 - For all ports in England, prioritising those known to receive higher volumes of travellers from Wuhan via indirect routes:*
>
> a. *Accelerate the roll out of the RING card (an aide memoire which highlights key symptoms of infectious diseases) to frontline Border Force staff in conjunction with supporting training. This is to support early recognition of compatible illness in passengers entering the UK.*
>
> *This is a potential option but NOT YET as it will be hard to recognise anything that distinguishes NCoV19 from ARI in general and support BF staff.*

b. *Add WN-CoV-specific information to the existing operational support information used by all airport ground staff. This is to support early recognition of compatible illness in passengers.*

Agreed but NOT YET

c. *Public information posters displayed in English and Chinese. It is suggested that includes information about NHS 111 should they be unwell after leaving the airport, but discussion with NHSE is underway to agree this. Posters can either be targeted to those airports known to receive direct flights and higher volumes of indirect travellers, or across all airports. This is to ensure that arriving passengers know about the symptoms to be aware of should they develop, and actions to take.*

Potentially OK but NOT YET

CMO is content for preparation work for options 2 and 3 to be done 'quietly' so they could be implemented quickly if deemed necessary in the future.

In summary, CMO/DCMO advise that it would be TOO SOON to do any additional measures on the basis of one case in Japan and one in Thailand (places with high Wuhan traffic and China generally). If by Monday we have two cases who have been in the UK (one fleetingly) and maybe a couple more 'pop-up' cases elsewhere in the world e.g. HK or Australia for example, then it might be the time to consider acting.

CMO is also conscious that there have been no new case declarations in China itself since 06JAN20 which could mean the outbreak is over and we are picking up tail ends or there will be a second round of reporting.

5.86. On 19th January 65 people were reported as infected, 3 outside of China with 2 deaths **(CJMW/039 – INQ000183356, CJMW/040 – INQ000183377)**.

5.87. On 19th January I had an email discussion with Sir Jeremy Farrar (Director of Wellcome), and subsequently Professor Van-Tam based on informal information Sir Jeremy had seen from an unpublished manuscript. This provided evidence, albeit in early form, of person-to-person spread (but not of sustained community transmission). We discussed whether there was asymptomatic transmission as that had practical implications, including for screening **(CJMW/041 – INQ000183355)**.

5.88. On 20th January the first DHSC Permanent Secretary led meeting on COVID-19 was held on the basis of increased perception of risk.

5.89. On 20th January OCMO alerted GO-Science that it was my view that we should hold a pre-SAGE (a SAGE meeting in advance of a formal request from Cabinet Office to activate SAGE) **(CJMW/042 – INQ000047510)**.

5.90. On 21st January 282 people were reported as infected, 4 outside China. There were 6 reported deaths **(CJMW/043 – INQ000183384)**.

From 22nd January to 6th February 2020

5.91. During this period there was a rapid escalation of activity across Government, and senior officials, Cabinet Office, 10 Downing Street, Ministers and the Prime Minister were informed by me and the GCSA of the risk, but not certainty, of a significant epidemic or pandemic affecting the UK with potentially large loss of life. See in particular the 4th February meeting with the Prime Minister, as described below at paragraph 5.117.

5.92. SAGE first met on 22nd January 2020), and reached the following assessment **(CJMW/044 – INQ000087535**

7. *There is evidence of person-to-person transmission. It is unknown whether transmission is sustainable.*

8. *The incubation period is unclear – but appears to be within 5 to 10 days; 14 days after contact is a sensible outer limit to use.*

9. *It is highly probable that the reproductive number is currently above 1.*

10. *It is currently estimated that the mortality rate for WN-CoV is lower than for SARS, but it is too early to reliably quantify that rate.*

11. *There is insufficient information currently on the genetic strain to comment on WN-CoV's origin.*

12. *There is no evidence yet on whether individuals are infectious prior to showing symptoms.*

13. *There is no evidence that individuals are more infectious when symptoms are more severe, but that is likely.*

14. *There appears to be very little genetic diversity in WN-CoV based on sequences available so far.*

15. *It is reasonable to argue – based on lessons from MERS and SARS, and consistent with exported cases of WN-CoV – that individuals returning from Wuhan are no longer at risk if they show no symptoms after 14 days.*

5.93. On 22nd January I wrote to DHSC health protection policy and PHE colleagues to suggest action needed at ports of entry **(CJMW/045 – INQ000203861)**:

> *I think given the cases overnight we need to be ready*
>
> *A) to put up posters everywhere in airports*
>
> *B) to hand out leaflets to all returning flights from China*
>
> *In pretty short order.*
>
> *I think we need to have a fallback plan for temperature screening.*

5.94. On 22nd January I briefed the National Security Council (Officials) on COVID-19.

5.95. On 23rd January Professor Sir Stephen Powis (NHS England Medical Director), Professor Sharon Peacock (PHE National Infection Service Director) and I sent a Central Alert System (CAS) alert message to clinicians offering advice for clinical staff encountering patients with respiratory infections arrived from overseas **(CJMW/046 – INQ000047535, CJMW/047 – INQ000047537)**. The alert stated:

> *Advice for NHS organisations is as follows:*
>
> *It is essential that an accurate travel history is obtained from all patients with acute respiratory infections to help identify potential cases.*
>
> *Primary care practices are asked to identify possible cases, isolate them immediately, and seek specialist advice from a microbiologist, virologist or infectious disease physician at your local trust. They are not expected to under-take any clinical assessment or sampling. Guidance for primary care can be found here.*
>
> *All acute trusts are expected to assess possible cases of Wuhan novel coronavirus using appropriate isolation facili-ties. They should review the Public Health England (PHE) guidance and ensure that they have considered how to operationalise this.*
>
> *Acute trusts should be prepared to undertake sampling and transport samples to PHE for testing as well as making arrangements for such patients to be identified immediately and isolated according to the PHE guidance, or in dis-cussion with PHE, in home isolation if appropriate.*
>
> *If the novel coronavirus is detected, the patient will be transferred to an Airborne High Consequences Infectious Diseases centre. PHE will undertake*

contact tracing and advise on management as more is known about this infec-tion. Guidance will be updated.

5.96. On 24th January I attended the first Ministerial COBR meeting on COVID-19.

5.97. On 24th January I had a first meeting on COVID-19 with the other UK CMOs. At the time this was Professor Sir Michael McBride (Northern Ireland), Sir Frank Atherton (Wales) and Dr Catherine Calderwood (Scotland).

5.98. On 27th January I met with GCSA and research funders (UKRI, MRC, Wellcome, NIHR) to discuss COVID-19 research likely to be needed in the event of escalation **(CJMW/048 – INQ000047580, CJMW/049 – INQ000203863, CJMW/050 – INQ000047578, 27th January 2020 - CJMW/051 – INQ000047579)**.

5.99. On 27th January the regular internal meetings on COVID-19 with the Secretary of State for Health and Social Care began.

5.100. On 28th January SAGE met a second time. The minute of that meeting records SAGE's current understanding of COVID-19 (paragraphs 9-23 of the minute) and the triggers for change in Government approach (paragraphs 28-30) **(CJMW/052 – INQ000203936)**.

Current understanding of WN-CoV

9. Origin: Current evidence suggests a single point zoonotic outbreak, which is now being sustained by human-to-human transmission. No evidence of ongoing zoonotic transmission.

10. Case fatality rate: currently estimated to be lower than SARS, but many uncertainties remain.

11. Reproductive number: estimated as between 2 and 3, in accordance with estimates from the Chinese authorities, but these figures are uncertain.

12. Doubling rate: estimated at 3 to 4 days.

13. Clinical presentations: varied, from mild coughing to fever and pneumonia. Uncertainty regarding clinical symptoms for individuals with mild illness.

14. Incubation period: likely to be average of 5 days, but considerable variation in specific cases.

15. Duration of infectivity: unknown, but 14 days seems a reasonable estimate.

16. There is limited evidence of asymptomatic transmission, but early indications imply some is occurring. PHE developing a paper on this.

17. Transmission route: respiratory.

18. SAGE urges caution in comparing WN-CoV with SARS and MERS: the transmission dynamics are different.

19. Control measures: ideally infection control in healthcare settings and rapid detection of cases.

20. It was agreed that Pandemic Influenza infection control guidance should be used as a base case and adapted.

21. Currently no evidence of control measures having an impact on transmission rate, but this is to be expected: not enough time has passed since implementation of measures.

22. SAGE supported the principle of self-isolation (but requires behavioural science input on public communication).

23. SAGE endorsed NERVTAG's position that those coming into contact with returning travellers to the UK, e.g. Border Force agents, do not need additional infection control measures to those currently advised.

Triggers for change in HMG approach

28. For UK: SAGE agreed that the current triggers which would require a change in HMG's approach (sustained human-to-human transmission outside China and/or a severe UK case) are appropriate.

29. For changing travel advice for China: NERVTAG advised a change in the geographical aspect of case definition, from Wuhan to a number of Chinese provinces. SAGE agreed that this should inform travel advice – which Chinese provinces is to be determined.

30. SAGE agreed to keep these triggers under review, e.g. if there were multiple, geographically-spread mild cases in the UK.

5.101. On 28th January I emailed William Warr the health Special Adviser (SpAd) in 10 Downing Street. This was the first direct communication from OCMO to 10 Downing Street on COVID-19. This email set out the possible scenarios that COVID-19 could take, taking account of SAGE and UK CMO views **(CJMW/053 – INQ000047585)**:

1) China has a major outbreak but brings it under control (R<1) demonstrating it can be done. There are cases seeded out to other countries, including almost certainly the UK, but these do not lead to sustained onward transmission (there may be a few secondary cases). This is the current situation. The main aim of current UK planning in public health terms is ensure we do not have outbreaks from index travellers, so that if the epidemic is brought under control it has had minimal impact on the UK.

2) The other is the opposite end of the risk scale and is our reasonable worst case scenario for which plans are also being developed. With R of 2-3, mortality of maybe 2% (wide confidence intervals around both of these and all other numbers), a doubling time currently of maybe 3-5 days and an incubation period of mean 5d this could within the next few weeks become widespread and turn into a significant pandemic relatively quickly. Currently it looks as if most (probably the great majority) of the mortality is in older people or those with pre-existing health conditions, but this is still an appreciable mortality, and above that for example seen in the 2009 H1N1 (swine flu) pandemic. We would have to use our current flu pandemic plans as a base case, but without a vaccine or antivirals.

3) What makes this a difficult dichotomous decision is that the economic consequences of over-calling can be substantial, but the mortality and social consequences of under-calling are even more substantial. To put some numbers on the economic effects: one World Bank estimate is that the SARS epidemic, which killed less than 1000 people (cf maybe 8000 people a year killed by flu in the UK in an average year) took $40Bn off the global economy due to reduced trade etc. It will take a few weeks before it becomes clear whether the substantial efforts of the government of China have reduced R, and if so by how much and whether it is now below 1.

4) Currently the priority is to prevent any UK transmission. If there was worldwide transmission (which may be the scenario within weeks) this would cease to be a realistic goal but we might be able to slow the initial upswing (which would have substantial operational advantages if it could be delayed until after the winter season); we are trying to model this. The aim for a pandemic becomes to minimise mortality (including indirect due to NHS load) and reduce social disruption, which would be significant.

5) The two other scenarios, for completeness, are:

- that the virus is less transmissible than it currently appears but remains as virulent, extends globally causing occasional severe pneumonia cases, but does not become a pandemic

- that the virus becomes less virulent as it adapts to human transmission, and over time tends towards the 4 existing human coronaviruses which cause colds.

Neither of these scenarios need major planning outside the NHS as they would be dealt with within the health service as a new variant of a normal respiratory tract infections.

6) Happy to expand on any point that is not clear. This is my view of the current situation, informed by SAGE (which has been chaired by GCSA, who can say if he disagrees) and after discussion with the other UK CMOs. The WHO may well announce a Public Health Emergency of International Concern (PHEIC) this week.

5.102. On 29th January 2020 the Secretary of State for Health and Social Care had a call with Dr Tedros Ghebreyesus, the Director-General of the WHO. Professor Van-Tam and I joined the call. I also briefed the Shadow Health and Social Care Secretary on COVID-19.

5.103. On 29th January 6,065 people were reported as confirmed infected, 68 outside China. There were 132 reported deaths, all of which were in China **(CJMW/054 – INQ000203942)**.

5.104. On 30th January I had a first meeting on COVID-19 with the Presidents and/or Chairs of the Royal Colleges relating to medicine which are the professional bodies for the medical profession, under the auspices of the Academy of Medical Royal Colleges, at that time chaired by Professor Dame Carrie MacEwan. This includes the Royal Colleges of Physicians, General Practitioners, Surgeons, Faculty of Public Health and others.

5.105. On 30th January WHO declared a Public Health Emergency of International Concern (PHEIC). The declaration of a PHEIC is promulgated by an emergency WHO committee (EC) made up of international experts operating under the International Health Regulations (IHR) 2005. These are of international but not always UK domestic importance. Between 2005 and 2020 there were five PHEIC declarations: the 2009

H1N1 influenza pandemic, the 2014 polio declaration, the 2013–2016 outbreak of Ebola in West Africa, the 2015–16 Zika virus epidemic, the 2018–20 Kivu Ebola epidemic. Only one (influenza H1N1) was a potential significant threat to the UK.

5.106. On 30th January the UK CMOs advised the public of an increase in the UK risk level from low to moderate **(CJMW/055 – INQ000203938)**.

> *We have been working in close collaboration with international colleagues and the World Health Organization to monitor the situation in China and around the world.*
>
> *In light of the increasing number of cases in China and using existing and widely tested models, the 4 UK Chief Medical Officers consider it prudent for our governments to escalate planning and preparation in case of a more widespread outbreak.*
>
> *For that reason, we are advising an increase of the UK risk level from low to moderate. This does not mean we think the risk to individuals in the UK has changed at this stage, but that government should plan for all eventualities.*
>
> *As we have previously said, it is likely there will be individual cases and we are confident in the ability of the NHS in England, Scotland and Wales and HSC in Northern Ireland to manage these in a way that protects the public and provides high quality care.*

5.107. On 31st January I led the first press conference on COVID-19. This was held in DHSC, unlike later press conferences, which were held at 10 Downing Street **(CJMW/056 – INQ000203868)**.

5.108. On 31st January it was announced that 2 patients, who were members of the same family, had tested positive for COVID-19; both Chinese nationals.

5.109. On 31st January I had a first meeting on COVID-19 with Directors of Public Health who work in local authorities as the lead public health official, including for health emergencies.

5.110. On 31st January Professor Powis, Professor Peacock and I sent another CAS alert updating the previous one. This advised an expansion of the geographical clinical case definition from Wuhan to all of mainland China, and included fever and removed sore throat from the clinical case definition **(CJMW/057 – INQ000068530, 31st January 2020 - CJMW/058 – INQ000203867)**.

5.111. On 31st January I met with one of the Prime Minister's Private Secretaries and William Warr, the health SpAd in 10 Downing Street. We discussed COVID-19.

5.112. On 2nd February the first death outside China was reported in the Philippines.

5.113. On 3rd February I met with Dr Tedros Ghebreyesus, Director General WHO and Dr Mike Ryan, Executive Director of WHO Health Emergencies Programme, in WHO headquarters Geneva. On this trip I also met colleagues from other countries including the US CDC. I also joined a meeting with the Chancellor, Foreign Secretary and Health Secretary and a separate Health Ministers G7 call.

5.114. On 3rd February SAGE had their third meeting. Their minuted summary of the situation was as below **(CJMW/059 – INQ000203939)**:

> *Situation update*
>
> *8. The epidemic is still in its early stages. It is a reasonable hypothesis that the epidemic is still growing exponentially – doubling every 4-5 days.*
>
> *9. Case ascertainment in China appears to be low: potentially 1 in 15 being identified, possibly 1 in 20. The scale of the epidemic in China could be in the region of 200,000 to 300,000 cases.*
>
> *10. Incubation period (time between exposure to infection and symptom onset): consensus of modellers puts this at 5 days, but range is 2 to 14 days.*
>
> *11. Generation time (the time between the infection of a primary case and one of its secondary cases) estimated at 6-7 days.*
>
> *12. There is some evidence of younger people in China showing symptoms.*
>
> *13. Sustained community transmission outside China should be expected.*
>
> *14. Data challenges remain: data from Hubei province, where testing is more thorough, is most reliable.*
>
> *15. To better understand the epidemic, it is important to have access to case numbers reported by onset date, data on numbers of people being tested, age distribution of cases and co-morbidity information – updated daily.*

5.115. On 3rd February Professor Powis, Professor Peacock and I sent another CAS alert to the health system. This was to healthcare professionals in primary care and community settings, including pharmacy **(CJMW/060 – INQ000068531)**. It advised that members of the public who may have been exposed to COVID-19 should phone NHS 111 and

not be referred to hospital emergency departments unless seriously ill. It also highlighted the public health advice, and guidance, which included:

> *All travellers who develop relevant symptoms (fever or cough or shortness of breath), however mild, within 14 days of returning from mainland China, should self-isolate at home immediately and call NHS 111.*

5.116. On 4th February NIHR and UKRI launched the first rapid research call, which offered funding for COVID-19 research. OCMO (Professor Van-Tam and I (as CMO and CSA)) had been heavily involved in its inception and launch.

5.117. On 4th February I first briefed the Prime Minister in person on COVID-19, in a wider meeting with 10 Downing Street on DHSC and NHS performance. In this meeting I reflected the view of SAGE that there was now the possibility of significant mortality in the UK. I gave 100,000-300,000 deaths as a figure that in my view mortality might well reach if this became a pandemic. This was my reported view at that time (as recorded in exchanges between the Permanent Secretary DHSC and the then Cabinet Secretary), although higher upper numbers of deaths from COVID-19 based on influenza pandemic planning Reasonable Worst Case Scenario (RWCS), were probably also mentioned at this meeting by others.

5.118. On 5th February 24,554 people were reported as infected, 191 outside China. There were 492 reported deaths, with 1 outside China **(CJMW/061 – INQ000203948)**.

Significant Activities - 6th February to 4th March 2020

5.119. On 6th February I first briefed MPs on COVID-19. All MPs were invited, and the meeting was hosted by the then Parliamentary Under-Secretary of State for Prevention, Public Health and Primary Care, Jo Churchill MP.

5.120. By this point in time OCMO had therefore provided initial briefings to the Prime Minister, the Secretary of State for Health and Social Care, COBR (so other key Cabinet Ministers), National Security Council officials, the Opposition, Members of Parliament, the medical Royal Colleges and Directors of Public Health among others. From this point on SAGE advice, representing a consolidated view, began to provide the main scientific input to policy advice directly and was given jointly by GCSA and me. Subsequent reporting below is therefore more limited as the minutes of SAGE, led by GO-Science became the best contemporaneous record of scientific advice given to

central Government but given the particular interest of the Inquiry into events up to the first lockdown I include some additional activities to that point in time.

5.121. On 7th February Professor Powis, Professor Peacock and I sent an updated CAS alert. This changed the geographical part of the case definition to include Thailand, Japan, Republic of Korea, Hong Kong, Taiwan, Singapore, Malaysia and Macau **(CJMW/062 – INQ000087249)**.

5.122. On 12th February OCMO set out to DHSC policy colleagues the trigger for a UK CMOs reassessment of the response **(CJMW/063 – INQ000047743)**:

> *The following scenarios would trigger a UK CMOs reassessment of the UK response:*
>
> - *Sustained transmission in Europe or other countries where the UK has close ties.*
> - *Clear failure of Chinese measures to reduce spread.*
>
> *Data related to these triggers are under constant review.*

5.123. On 12th February 45,171 people were reported as infected, 441 outside China. There were 1,115 reported deaths, with 1 outside China **(CJMW/064 – INQ000203943)**. My expectation at the time, in common with other scientific experts, was that the figures from China were likely to be an underestimate.

5.124. On 14th February France announced the first death from COVID-19 in Europe.

5.125. On 14th February I first briefed the Cabinet on COVID-19.

5.126. On 19th February 75,199 people were reported as confirmed infected, 1,014 outside China. There were 2,010 reported deaths, with 6 outside China **(CJMW/065 – INQ000203869, CJMW/066 – INQ000203870)**. The previous data used came from WHO reports. At this point the DHSC had started to produce a daily situation report, including cases and deaths. As these were the data OCMO used at the time this statement uses these data from this point forward. Subsequent descriptions of cases and deaths use these data.

5.127. On 25th February Professor Powis, Professor Peacock and I sent an updated CAS alert. This made further edits to the geographical scope of the case definition **(CJMW/067 – INQ000068537)**:

> *If you have returned from these specific areas since February 19th, you should call NHS111 and self-isolate even if you do not have symptoms:*

- *Iran*
- *Specific lockdown areas in Northern Italy as designated by the Government of Italy*
- *Special care zones in South Korea as designated by the Government of the Republic of South Korea*
- *Hubei province (as previously noted)*

If you have returned from these areas since February 19th and develop symptoms, however mild, you should self-isolate at home immediately and call NHS111. You do not need to self-isolate if you have no symptoms.

- *Northern Italy (defined by a line above, and not including, Pisa, Florence and Rimini)*
- *Vietnam*
- *Cambodia*
- *Laos*
- *Myanmar*

Those who have returned from previously identified geographic areas within the past 14 days and develop symptoms, however mild, should self-isolate at home immediately and call NHS111.

5.128. On 26th February 81,050 people were reported as confirmed infected, 2,986 outside China. There were 2,761 reported deaths, with 46 outside China **(CJMW/068 – INQ000203872)**.

5.129. On 2nd March the NIHR/UKRI rapid response research call assessment panel met to assess applications and make recommendations on funding for the first part of the research call. This first part focused on vaccines and therapeutics. Professor Van-Tam briefed the panel ahead of their discussion.

5.130. On 4th March 93,143 people were reported as infected, 12,873 outside China. There were 3,169 reported deaths, with 188 outside China. In the UK 85 people had been reported as infected and there were 0 reported deaths **(CJMW/008 - INQ–INQ000203876)**.

Significant Activities - 5th March to end of March 2020

5.131. On 5th March the first UK death was announced.

5.132. On 5th March I appeared, together with Professor Harries, in front of the Health and Social Care Select Committee to answer questions on COVID-19. This was an important opportunity to inform parliamentarians and via the media who followed this session closely, the public about our contemporary understanding of COVID-19 through a long form discussion **(CJMW/069 – INQ000203945)**.

5.133. On 5th March Professor Powis, Professor Peacock and I sent an updated CAS alert further extending the geography of the case definition **(CJMW/070 – INQ000068538)**

5.134. On 10th March Professor Powis, Professor Peacock and I sent an updated CAS alert. The key changes were to expand the case definition to include those presenting in hospital with certain symptoms, regardless of travel history **(CJMW/071 – INQ000203878)**:

> *Advice for NHS organisations is as follows:*
>
> *Individuals presenting at hospital*
>
> *To improve case detection in those with no geographic link, patients who require admission to hospital should be tested regardless of travel history if they present with*
>
> - *Clinical or radiological evidence of pneumonia or acute respiratory distress syndrome*
>
> *OR*
>
> - *Influenza-like illness*

5.135. On 11th March 118,455 people were reported as confirmed infected, 37,677 outside China. There were 4,290 reported deaths, with 1,132 outside China. In the UK there were 456 people reported as confirmed infected and 6 reported deaths **(CJMW/072 – INQ000203880)**.

5.136. On 11th March WHO declared COVID-19 a pandemic.

5.137. On 12th March Professor Powis, Professor Peacock and I sent an updated CAS alert which removed completely the geographical aspect of the case definition **(12th March 2020 - CJMW/073 – INQ000048070)**:

> *Advice for NHS organisations is now as follows:*
>
> *1. From today the public are being advised to stay at home (self-isolate) without any testing for COVID-19, regardless of travel history or contact with confirmed cases, if they have:*

a. A new continuous cough

OR

b. High temperature (of 37.8 degrees centigrade or higher)

2. The geographic element of the case definition has now been removed. Travel and contact history are no longer important for diagnosis, which is on the basis of symptoms alone. If people who have travelled do not have symptoms they do not need to stay at home, regardless of their travel history.

5.138. On 16th March in the UK there were 1,544 people reported as confirmed infected and initially 35 reported deaths with a further 20 deaths reported later **(CJMW/009 – INQ000203882)**.

5.139. On 16th March Professor Powis and I wrote to all NHS Trusts asking for their full support in implementing the RECOVERY trial of drugs for patients with COVID-19 **(CJMW/009-A - INQ000048103)**.

5.140. On 16th March the Secretary of State for the Department of Health and Social Care advised the public against all unnecessary social contact. The Prime Minister urged people to work from home and avoid pubs and restaurants. Isolation of households with a symptomatic case was introduced. Social distancing for the moderately clinically vulnerable was announced **(CJMW/074 – INQ000203947)**.

5.141. On 17th March the NIHR/UKRI rapid response research call assessment panel met to assess applications and make recommendations on funding for the second part of the research call. This second part focused on wider research into COVID-19.

5.142. On 18th March in the UK there were 2,626 people reported as confirmed infected and 103 reported deaths **(CJMW/075 – INQ000203886)**.

5.143. On 18th March the Government announced that from 20th March all schools in the UK would be closed for in-person teaching, except for children of key workers and children considered vulnerable **(CJMW/076 – INQ000203937)**.

5.144. On 19th March the first patient was recruited onto the RECOVERY trial, one of the six research applications funded by the NIHR/UKRI rapid research call. RECOVERY would go on to provide definitive results for several drugs, including dexamethasone.

5.145. On 20th March in the UK there were 3,983 people reported as confirmed infected and 177 reported deaths **(CJMW/077 – INQ000203888)**.

5.146. On 20th March the Prime Minister announced the closure of all pubs, restaurants, gyms and other social venues **(CJMW/078 – INQ000203946)**.

5.147. On 21st March Professor Powis and I sent a CAS alert to ask clinicians for help in the management and shielding of patients at highest risk of severe morbidity and mortality **(CJMW/079 – INQ000068544)**.

5.148. On 23rd March in the UK there were 6,650 people reported as confirmed infected and 335 reported deaths **(CJMW/010 – INQ000203892)**.

5.149. On 23rd March 2020 the Prime Minister announced the restrictions that are commonly termed national lockdown.

5.150. On 23rd March the first 6 research projects from the NIHR/UKRI rapid research call were formally announced. Due to the urgency the researchers had been informed before the announcement and so had already started the research. The funding included £2.1m for the RECOVERY trial (a clinical trial aimed at identifying treatments for people hospitalised with COVID-19) and £2.6m for what became the Oxford Vaccine.

5.151. On 24th March the 10th patient was recruited to RECOVERY.

5.152. On 27th March the 100th patient was recruited to RECOVERY.

5.153. On 30th March in the UK there were 22,141 people reported as confirmed infected and 1,408 reported deaths **(CJMW/080 – INQ000203897)**.

5.154. At this stage the decision-making structures that received advice became more formal and regular. An explanation of these structures is best given by the Cabinet Office. Most decision-making meetings were minuted by Cabinet Office, 10 Downing Street or Ministerial Private Offices. The minutes of SAGE meetings together with accompanying background papers are published and available online and provided the underlying scientific advice, usually given jointly with GCSA. In the circumstances, I have not addressed the remainder of the period of interest to Module 2 to the same detail as above. I can, of course, provide more detail in respect of any specific areas of particular interest to the Inquiry. To assist however, I have addressed a number of specific areas which may be of importance.

Pandemic Trajectories

5.155. As well as the routes for providing advice outlined above (e.g. SAGE and Cabinet Office) the OCMO also provided some separate written advice to Cabinet Office and 10 Downing Street decision makers. Some of the most relevant advice provided to decision makers was scenarios for what might happen next. This was separate from formal modelling transmitted via SAGE. These recognised the considerable uncertainty and allowed decision makers to frame their decisions in the scientific reality, including that uncertainty. An early example of this was provided in response to a 10 Downing Street request and on 28th Jannuary, as quoted above **(CJMW/053 – INQ000047585)**; other examples are in the following paragraphs.

5.156. Other examples of these documents that set out a strategic approach to the pandemic and a possible trajectory were sent to central decision makers at various points. I, and OCMO, considered an important part of our role to be to ensure that Ministers made decisions based on the likely reality of the pandemic. This included making it clear that this was going to be a long-term challenge, which I tried to make clear from 24th January 2020 when describing the response as "a marathon not a sprint" **(CJMW/081 – INQ000203941, CJMW/082 – INQ000203884)**. I also made this point in the trajectory documents listed below.

5.157. Another key feature was ensuring that it was understood that no option came with only good outcomes; even when restricted to health outcomes the choice was usually between two bad outcomes with one being worse. For example lockdown would reduce direct deaths from COVID-19 but increase the risk of indirect deaths and loneliness. Ministers would get additional information on non-health impacts and harms (e.g. economic) from other sources. Whatever action was taken would have a significant detrimental impact on the health of the UK public, and their wider lives, and the aim of policy was to minimise this. Again, I attempted to make this clear to Ministers from early in the pandemic, explaining that excess mortality would come from four broad sources, including indirect deaths caused by the actions taken to control the pandemic **(21st March 2020 - CJMW/083 – INQ000203890)**. Examples of trajectory documents, both formal and informal, include:

- Coronavirus: summary of strategic and tactical approach to the epidemic **(CJMW/083 – INQ000203890)** sent to the Secretary of State for Health and Social Care on 21st March 2020, the Prime Minister's Adviser on 22nd March 2020 and the Cabinet Secretary on 23rd March 2020. **(CJMW/084 –**

INQ000203889, CJMW/085 – INQ000048171, CJMW/086 – INQ000048176).

In light of the significance of this advice, and its distribution, I quote it in full below.

1) *Coronavirus (COVID-19) will cause significant increased mortality and ill-health in the UK and globally.* ***Our strategic aim is to minimise mortality over the course of the epidemic****. Excess mortality will come from a number of causes and there is a* ***tactical approach to address each****.*

   a) *The most obvious is direct mortality from people dying of the virus despite best medical care.*
   b) *A second major indirect cause of mortality is from the NHS emergency services being overwhelmed and therefore providing significantly less effective care both for those with coronavirus and for those with other medical emergencies.*
   c) *A third cause of mortality and more commonly increased ill-health will be the postponement of important but nonurgent medical care and public health programs such as screening whilst the NHS is diverting resources to manage the epidemic.*
   d) *There is a strong correlation between economic disadvantage and ill-health and in the long-term any prolonged increase in poverty due to our countermeasures will feed through to poor physical and mental health outcomes.*

2) *From the start of this epidemic the aim has been to contain the virus, delay its spread and the initial peak, undertake the research to ensure we can combat it effectively in the medium and long-term, and mitigate the effects of the initial wave of the epidemic. The initial case finding and isolation of early cases which was part of the contain as well as delay strategy helped slow down seeding in the UK pushing the peak out from the winter season. Full containment became impossible once the outbreak became globally pandemic.*

3) *The overall* ***direct*** *mortality rate from coronavirus infection is relatively low (1% or less of those infected is likely with optimal treatment), and even in the most high-risk groups the majority will recover. A very large number of people who are likely to be infected means however there is the potential for a very large absolute number of deaths over a short period of time. There may be a higher or much higher proportion of people infected without symptoms (asymptomatic) than currently assumed, in which case overall mortality rates would be lower but absolute numbers are still likely to be substantial.*

4) *The principal actions to reduce* ***direct*** *mortality are*

   a) *Reduce the total number of people acquiring the virus. Pulling the peak of the epidemic down means there is not an overshoot where more people become infected than would occur naturally without mitigation (social distancing measures).*

b) *Try to ensure that those who are most at risk of mortality are least likely to catch it through enhanced social distancing and shielding of the most at risk. This needs to take account of the fact social isolation comes with a cost to mental and physical health.*
c) *Protect the NHS capacity to maintain low and high level respiratory support through the peak of the epidemic so this is available to Covid patients (see indirect causes of mortality below).*
d) *Undertake research into existing drugs and combinations which can help to reduce mortality rates in the sickest patients (short to medium term).*
e) *Undertake research into novel treatments to reduce mortality (medium to long-term).*
f) *Undertake research into a vaccine which would protect the most vulnerable (long-term, success is not guaranteed).*
g) *Minimise transmission in hospitals to already sick patients (nosocomial infection- includes PPE).*

5) *The principal actions to reduce **indirect mortality** from coronavirus and other medical emergencies due to the NHS being overwhelmed are:*

Reduce demand and length of stay.

a) *Through general social action and social distancing reduce the height of the peak to a level the NHS can cope. This requires getting the effective reproductive number R to 1 or below or exponential growth will continue. The biggest levers are the actions the government has announced over the last two weeks, including individual and household isolation and recommending against all unnecessary social interactions including closing pubs, clubs, leisure activities, schools etc. If current measures are sufficient to get R to 1 or below it is likely the NHS will cope; if they are not, it will not. Modelling implies that if population adherence is good current actions are sufficient; without adequate adherence exponential growth will continue albeit at a much slower rate and the NHS critical care facilities will eventually be overwhelmed.*
b) *Achieving extra social isolation for more vulnerable groups as these are more likely to convert into hospital admissions as well as deaths (similar to 4b).*
c) *Use drugs to treat coronavirus which reduce bed stay even if they do not reduce mortality (research being conducted).*
d) *Reduce preventable pressures in the NHS, eg through vaccination (pneumococcal and flu).*

Increase staff levels (supply):

e) *Actions to protect NHS staff from infection (PPE).*
f) *Rapid scale up of antigen testing of NHS staff who have to self-isolate so that they can return to the workforce quickly if they do not have the infection, or will be assured that they are not likely to get it again if they do.*
g) *Repeated antibody (serology) test of NHS staff so that those who are likely to have at least temporary immunity are identified- still at research/development stage.*

h) *Increasing NHS workforce temporarily by bringing those working in other areas or recently retired.*

Increase supply of available beds and kit.

i) *Postponing all nonurgent healthcare and solving delayed discharge to expand bed and staff capacity.*
j) *Expanding ventilator and other respiratory capacity since this is the principle part of the system which will be overwhelmed by coronavirus. ITU bed capacity is a good proxy.*
k) *Acquiring additional capacity from outside the NHS including the private sector.*
l) *Spread the load around the country depending on local hotspots.*

6) *Reducing the impact of **postponement** of important but nonurgent healthcare, and public health **preventive measures**.*

a) *Either do not close down services where this will not materially help coronavirus effort or, more commonly, reinstate them rapidly when it is clear they are not contributing in a major way. The further services are away from respiratory support the less likely they are to be directly affected. Elective surgical care will be affected because theatre and recovery rooms are needed for ventilation support surge capacity.*
b) *Shorten the period over which the epidemic runs. There is a tension between the need to reduce indirect deaths laid out in 5) above which benefit from spreading coronavirus admissions over the longest possible period, and the need to return services to normal.*
c) *Promote public health measures which do not involve health staff, such as exercise.*

7) *Reduce the impact of **poverty and loss of jobs** which will lead to long-term poor health outcomes.*

a) *Economic support for jobs and people in the short term.*
b) *Lift any social distancing restrictions which prove to be ineffective in a phased way. Requires more data.*
c) *Shorten the period of the epidemic.*

8) Metrics for the next stage.

The aim of the next stage is to get R to or below 1 so that exponential growth stops, at a level where expanded ICU and respiratory support can cope. For this the essential metrics are:

a) *Doubling time of cases, ICU cases and deaths.*
b) *The R force of transmission.*
c) *ICU bed capacity and projected capacity as the epidemic progresses.*

Once this is stabilised the epidemic moves to a different stage.

9) ***How will it end?** All epidemics come to an end, or have their effect significantly reduced, either through natural means or human intervention.*

Medical science has proved highly effective at combating multiple infections, and this will be no different. At this early stage of the epidemic we cannot be sure how, or how soon, we will have effective medical countermeasures. We will continue to learn from the international experience. There are three likely exits, which are not mutually exclusive, and one which will not be happening with this virus.

a) *Natural end to the epidemic. The epidemic infects a sufficiently large portion of the population that the epidemic wave burns out (sometimes called herd immunity). Is likely then to return in smaller waves particularly in the winter months.*
   -If there is a very large proportion of the population infected asymptomatically this might be occurring relatively quickly and with small numbers of deaths, but this cannot be assumed. Proportion infected asymptomatically is a key unknown.
   -If a natural ending of the epidemic is the exit, but with a small proportion of people infected asymptomatically (so the current 1% overall mortality figure remains roughly right), social distancing will need to be maintained for a prolonged period to reduce the peak to prevent direct and indirect deaths and even with optimal management death numbers will be high by the end of the epidemic.
   -If this is the endpoint individuals who have had coronavirus will gradually be able to renter normal life once they can be detected by serology, allowing for a gradual resumption of normality.
b) *Effective treatments are developed which mean the mortality rate drops very substantially. The epidemic would probably still follow its natural path and peak but with much lower loss of life, and less pressure on ITU care. Treatment is for example what turned around the outlook for the HIV pandemic. It is likely we will get slightly or moderately effective treatment soon by repurposing older drugs (weeks to months), and may get highly effective newer treatment in the medium term.*
c) *A vaccine. There are many candidates, but no guarantee any will work. If they do they will not be likely to be available at scale for at least 18 months. Vaccines could either be for the whole population or (more likely) to protect the most vulnerable.*
d) *Eradication / disease disappears. This is highly unlikely for this virus; it is too widespread just to disappear (SARS), and would not be possible to eradicate.*

10) This is a global pandemic, so UK actions cannot be seen in isolation.

a) *Full suppression in the UK without widespread immunity through natural infection or vaccine if there is active transmission elsewhere will lead to reintroduction. The endgame should be seen as global as well as local.*
b) *Global as well as UK research will contribute to our understanding and countermeasures and the endgame. The UK is however a leader in the field of combatting infectious diseases.*

- Possible pathways to the end of the COVID-19 epidemic: health and scientific considerations sent to Director General Cabinet Office on 5th April 2020 **(CJMW/087 – INQ000068686, CJMW/088 – INQ000068683)**.
- Three scenarios over winter sent to Simon Case (who led on COVID-19 for 10 Downing Street and then became Cabinet Secretary) on 3rd September 2020 **(CJMW/089 – INQ000070554)**.
- The Path to Spring sent to 10 Downing Street on 2nd October 2020 mainly to avoid premature optimism in Government communications that things were getting better **(CJMW/090 – INQ000070966)**.
- Spring 2021 and COVID-19 sent to James Bowler (led on COVID-19 for 10 Downing Street) on 29th October 2020 **(CJMW/091 – INQ000071377, CJMW/092 – INQ000071378)**.
- The Path to Spring 2022 sent to Simon Case (Cabinet Secretary) and James Bowler on 2nd February 2021 **(CJMW/093 – INQ000072657)**.

More formal submissions making the same point came from SAGE. The DHSC, Office for National Statistics (ONS), Government Actuary's Department (GAD) and Home Office (HO) worked together to produce quantitative analyses of possible indirect deaths from COVID-19 **(15th July 2020 - CJMW/094 – INQ000220213, 17th December 2020 - CJMW/095 – INQ000074959)**.

Locking down and unlocking

5.158. SAGE provided consolidated scientific advice, including scientific advice modelling the impact of interventions and the combined interventions needed to control the spread of the virus at a given time, including lockdown. Unlocking was more incremental and so advice was spread out across a wider range of scientific sources.

5.159. OCMO provided high level written comment on specific central decision making, often in relation to the relaxation of measures. This was often to ensure that the risks were being correctly framed so that decision makers were weighing up the true impacts. Making clear to decision makers the trade-offs that were possible was a significant part of our role, with a major concern that each risk being taken seemed reasonable in isolation, but the cumulative effect was non-trivial and needed to be flagged to Ministers. Examples include:

High-level overview documents sent to Cabinet Office on 30th March 2020 **(CJMW/096 – INQ000203893, CJMW/097 – INQ000203894)**

- Note from me to Simon Case 26th May 2020 **(CJMW/098 – INQ000069434, CJMW/099 – INQ000069418)**

  "We need to think however not only about individual decisions but about the totality of the changes, how they interact in linking households and the pace at which these are planned to occur. Multiple, small changes, appearing reasonable when examined in isolation, can easily lead to R going above 1, and we will be at severe risk of a second wave. There is always a temptation to push the risk just a little bit further on every decision; this is happening across government, often by people unaware of the other changes."

- Accuracy of risk assessments and cumulative risk impact 12th June 2020 **(CJMW/100 – INQ000069669)**

  "Clearly it is entirely reasonable for Ministers to take a risk that might be considered high, if the fact it is high is clearly flagged to them. I am concerned that decisions could be taken by Ministers where the implication of official advice is that the individual or cumulative risk is low or medium when it is not."

- Reopening closed sectors 8th July 2020 **(CJMW/101 – INQ000070032)**
- Comments on PM speech 10th July 2020 **(CJMW/102 – INQ000070050)**

  "As you know I think there are 4 risks that are the short term backdrop, and several opportunities from science in the longer term. Resurgences may occur in winter/early spring (seasonal advantage to the virus and disadvantage to the NHS test and trace), autumn (schools + season), because we lift restrictions too fast or too completely, or because another global wave hits us. On the other hand we will get more drugs, and may get a vaccine, fairly soon and incrementally science will give us enough tools to get on top of this. But fairly soon in science terms does not mean before spring next year. So up to next year it is hard to paint a particularly optimistic picture; from next spring that becomes a lot easier to sustain."

- Comments on PM speech 12th July 2020 **(CJMW/103 – INQ000070070)**
- For review draft of roadmap chapter 14th July 2020 **(CJMW/104 – INQ000070086)**

- Comments on speeding up roadmap on 15th March 2021 **(CJMW/105 – INQ000073006)**
- National and local messages 30th July 2020 **(CJMW/106 – INQ000070240)**
- Tier 3 and use of a circuit breaker 9th October 2020 **(CJMW/107 – INQ000071071)**

  "There were two options we thought had a reasonable chance of success of meeting the strategic goals set out by the PM, based on SAGE advice, in some combination:

  1) A package of interventions sufficient to get areas with rapidly rising transmission back to around R<1, stabilising the situation but not decreasing incidence below current rates. These would, by definition have to be maintained over the entire major period of risk, which probably for practical purposes means to the end of winter (ie 5-6 months). Incidence would not drop below what it is now but track along even if the package were sufficient. R may naturally rise over the respiratory virus season requiring additional measures to retain status quo.

  2) A firebreak period of very strong measures for a defined period of a few (2-4) weeks that have a high chance of pushing R below 1 so cases fall, resetting the clock on transmission. It should be possible to get away with fewer NPIs over the long run than 1) above if this approach is taken but some would still be needed.

  The current minimum package, which at its core is pretty limited, for only 4 weeks is likely to be neither significant enough to achieve a time limited firebreak, nor prolonged enough to maintain control albeit at a higher level. Only if Local Authorities chose to go to the top of the possible range of options which are defined as 'subject to engagement' across multiple domains would it be likely to have an effect in a short period, and even this is not certain. Longer periods of significant NPIs are likely to be needed in these high incidence areas"

Specific areas of advice

5.160. In addition to this framing advice on the overall approach to COVID-19 the OCMO also provided decision makers with advice on specific topics, based on our understanding of the science at that point in time. Examples of this included advice on:

- Indirect causes of mortality and international comparisons **(30th April 2020 - CJMW/108 – INQ000069007, CJMW/109 – INQ000069008)**. I explained here the four causes of COVID-19 mortality and that in my view the measure of mortality should be excess all-cause mortality (ideally age-adjusted, per 100,000) which takes account both of the different methodologies for measuring COVID-19 and the indirect causes of mortality. That was also my public view, expressed on 22nd April 2020 **(CJMW/110 – INQ000203898)**. On 20th December 2022 the Office for National Statistics published data comparing all-cause mortality between European countries between 28 December 2019 and 1 July 2022 **(CJMW/111 – INQ000203970)**. These data show the UK had the 16th highest relative cumulative excess mortality of the 33 countries analysed.
- Principles to consider when reviewing 2m social distance **(14th June 2020 - CJMW/112 – INQ000069679)**
- Ethnicity **(25th July 2020 - CJMW/113 – INQ000070202, CJMW/114 – INQ000070195, CJMW/115 – INQ000070194**
- Schools **(23rd August 2020 - CJMW/116 – INQ000070464)**
- Christmas holidays **(16th December 2020 - CJMW/117 – INQ000072162)**
- Delta variant **(14th May 2021 - CJMW/118 – INQ000073309, CJMW/119 – INQ000073308**
- Approach to variants **(7th February 2021 - CJMW/120 – INQ000072707)**
- Diamond Princess Cruise Ship **(16th February 2020 - CJMW/121 – INQ000047773)**
- Mass testing **(20th November 2020 - CJMW/122 – INQ000071777)**
- Long Covid **(31st May 2021 - CJMW/123 – INQ000073417)**
- Antivirals **(31st August 2021 - CJMW/124 – INQ000073815)**
- Vaccines for 12-15 year olds **(13th September 2021 - CJMW/125 – INQ000203916, CJMW/126 – INQ000203917, CJMW/127 – INQ000203918, CJMW/128 – INQ000066870, CJMW/129 – INQ000203920, CJMW/130 – INQ000066878)**

- Non-health impacts of Omicron **(15th December 2021 - CJMW/131 – INQ000074537)**

5.161. I was part of a number of WhatsApp groups set up by key decision makers. The OCMO have provided the Inquiry with a list of these WhatsApp groups. Given the complexity of the technical issues discussed and the need to balance harms I (and GCSA) tried to make sure major decisions were informed either by proper written advice by email or a paper (from SAGE, OCMO, GCSA or others) or more commonly in meetings where issues could be laid out more fully and misunderstandings addressed, ideally with data.

Interaction with experts

5.162. OCMO worked closely with a wide array of external experts, both in Government, in the NHS, in academia and with international experts. Below I set out a summary of some of the work with expert advisory groups, with key expert colleagues and with the international expert community.

Expert advisory groups

5.163. OCMO worked closely with expert advisory groups throughout the pandemic, examples include NERVTAG, SAGE and JCVI. These groups brought experts together to discuss the data and to reach a consensus or central view. This was then fed into decision making.

5.164. The New and Emerging Respiratory Virus Threats Advisory Group (NEVRTAG) are a DHSC committee advising the Government on the threat posed by new and emerging respiratory viruses. NERVTAG members are independent experts who volunteer to provide their expertise, they are competitively appointed. NERVTAG provide clinical and scientific advice. NERVTAG is supported by a scientific secretariat from UKHSA. Members of the OCMO team attended NERVTAG as observers. NERVTAG minutes are published online.

5.165. NERVTAG was established in 2014, replacing the UK Scientific Pandemic Influenza Advisory Committee (SPI) and extending the role of the group to cover not only pandemic influenza but any new, emerging respiratory virus threat to the UK. With this expanded remit, NERVTAG has routinely considered a range of respiratory viral threats, including avian influenza viruses and MERS. On its establishment, it was

agreed the group would draw on the expertise of scientists and health care professionals, including clinicians, microbiologists and public health practitioners, and colleagues in related disciplines and is scientifically independent.

5.166. Between 2014 and 2019 NERVTAG met 2 to 3 times per year. For obvious reasons, COVID-19 led to a substantial increase in such meetings.

5.167. Between January 2020 and June 2021 NERVTAG met around 75 times.

5.168. On 13th January 2020 NERVTAG met, at my request **(CJMW/024 – INQ000047488)**, to discuss the news of an outbreak in Wuhan, China. Professor Van-Tam attended that meeting.

5.169. NERVTAG was, and is, chaired by Professor Sir Peter Horby for the period of relevance to Module 2.

5.170. Early in the pandemic, with limited data, NERVTAG provided initial advice including on clinical assumptions such as infection attack rate, duration of hospitalization and case fatality rate. NERVTAG provided advice throughout the time period relevant to the Inquiry on a range of areas, including: clinical management of COVID-19 (including treatments), contact tracing, symptoms and case definition, decontamination and environmental survival, immunity, epidemiology and travel. NERVTAG advice played a key role in the response to variants, for instance NERVTAG advice from 18th December 2020 on Alpha **(CJMW/132 – INQ000203959, CJMW/133 – INQ000120454)**.

5.171. SAGE is the main conduit in the UK for scientific input in the event of a major emergency that needs need scientific input. It has no standing membership other than the GCSA and is set up with relevant experts from within and outside Government for any emergency that requires significant scientific advice on a cross-Government basis. SAGE exists to ensure Government can integrate science from multiple groups, and that a single version of the scientific advice, presented with appropriate levels of confidence and outlier opinion if relevant, is presented to policymakers rather than several slightly different versions of advice. GO-Science and individual Government Departments maintain lists of experts who can be called on in an emergency, who tend to be the earlier members but later members were chosen for specific skill gaps. While SAGE main committee members generally have to have some generalist science skills to incorporate science from many disciplines in addition to their own specialism, specialist sub-committees have deep subject experts in particular fields. SAGE took

advice both from the standing committees (already in existence) and ad hoc committees (set up for COVID-19) that considered issues such as care homes or schools.

5.172. During the pandemic, and as explained above, the GCSA and myself as CMO co-chaired SAGE. Once activated SAGE was the formal route for providing a central view of the science advice to COBR. Although it was agreed that the GCSA would chair most meetings rather than trying to split this, the minutes for SAGE COVID-19 meetings were approved by both of us. The GCSA and I, both individually and together, represented the advice from SAGE within Government. Advice given in SAGE meetings was minuted and form the official record of advice. All SAGE minutes are published and publicly available, along with background papers that inform that advice. The SAGE secretariat sits within GO-Science, which is best placed to set out how the processes and structures of SAGE work. The first pre-SAGE meeting of the pandemic was on 22nd January 2020 **(CJMW/044 – INQ000087535**

5.173. Throughout the pandemic SAGE played a key role in synthesizing the known science and summarising it for decision makers. The GCSA and I fed that scientific advice into 10 Downing Street and the Cabinet Office.

5.174. SAGE had a selection of sub-groups that fed advice into the main group. I expect that these will be set out in more detail by GO-Science, but I will briefly refer to a selection below.

5.175. One was the Independent Scientific Pandemic Insights Group on Behaviours (SPI-B), comprised of behavioural scientists. They provided advice on the behavioural impacts of the pandemic and pandemic response.

5.176. Another sub-group of SAGE was the Scientific Pandemic Infections Group on Modelling, Operational subgroup (SPI-M-O). They provided the modelling input into SAGE.

5.177. In non-emergency periods, the Scientific Pandemic Infections Group on Modelling (SPI-M) provides expert modelling and epidemiological advice to the DHSC and wider UK Government on scientific matters relating to the UK's response to a pandemic, major epidemic or outbreak. The group may also provide advice on other emerging human infectious disease threats as required. DHSC has sponsorship of SPI-M and determines its programme of work.

5.178. During an emergency, SPI-M-O may be stood up as an operational subgroup of SAGE to support the Government's response. Participants may be partly or mostly drawn from SPI-M, but with additional contributors to reflect the specific emergency and expertise required. The secretariat for both groups is provided by DHSC.

5.179. Advice provided by SPI-M and SPI-M-O represents a consensus view of the group, with the co-chairs responsible for reporting the scientific advice to DHSC (SPI-M) or SAGE (SPI-M-O) and ensuring the scientific integrity of the group's discussion and outputs. SPI-M and SPI-M-O participants are typically from the academic community and public health agencies and contribute as experts in the field of epidemiological modelling and statistics.

5.180. The first meeting of SPI-M-O took place on 27th January 2020, with SAGE formally agreeing that "*SPI-M*[-O] *(Scientific Pandemic Influenza Group on Modelling) is now a formal sub-group of SAGE for the duration of this outbreak*" at the second SAGE meeting on COVID-19 on 28th January 2020.

5.181. SPI-M-O's consensus views brought together the modelling outputs and shaped the initial response. Given the sensitivity of modelling to assumptions made, and the wide panel of possible models, it was important to have SPI-M-O, who brought together different modelling groups and present a consensus view rather than relying on a single model. Modelling became increasingly sophisticated as the pandemic progressed and as much more detailed and accurate data became available.

5.182. The Joint Committee of Vaccination and Immunisation (JCVI) provide advice on the use of vaccinations and immunisation, and as it provided advice directly to OCMO and DHSC rather than via SAGE for many of its decisions I give a fuller explanation here. They did not provide advice early in the pandemic response as there was no COVID-19 vaccine but were a key committee from autumn 2020.

5.183. JCVI is an independent Departmental Expert Committee (DEC) and Scientific Advisory Committee (SAC) and, unlike most other DECs/SACs, has a statutory basis in England. It is formed of a main committee with subject specific sub committees. JCVI was originally an advisory board for polio immunisation that became the JCVI in 1963. It was put on a statutory footing when it became a Standing Advisory Committee, established in England and Wales under the NHS Act 1977. NHS (Standing Advisory Committees) Order 1981 (SI 1981/597) established the JCVI in its current form. That order specifies that it is constituted for the purpose of advising on *'The provision of vaccination and immunisation services being facilities for the prevention of illness.'*

5.184. Appointments to the JCVI committee are made on merit and in accordance with the principles of the Code of Practice for Scientific Advisory Committees and the Cabinet Office's Governance Code for Public Appointments, which is regulated by the Commissioner for Public Appointments. New member appointments are routinely made through an open competition

5.185. JCVI provides advice and recommendations for all UK health Departments based on consideration of scientific and other evidence that is used by Government to inform, develop and make policy. All four nations have observers on the JCVI and while it has no statutory basis in Scotland or Northern Ireland, on most vaccine programmes JCVI advice is adopted.

5.186. JCVI when providing advice on COVID-19 was chaired by Professor Wei Shen Lim, standing in for JCVI Chair Professor Sir Andrew Pollard who had a perceived conflict of interest arising from involvement with the Oxford/AstraZeneca vaccine.

5.187. The JCVI advice on COVID-19 is public and was widely publicised at the time with the Chair briefing the public, often alongside Professor Van-Tam. OCMO anticipates that further detail on the role of JCVI will be addressed in a future Inquiry Module, covering vaccination.

Key experts

5.188. OCMO worked very closely with a wide range of expert colleagues in Government. Examples of this include the GCSA, experts in PHE (subsequently UKHSA) including Professor Susan Hopkins and Professor Sharon Peacock, experts in the NHS, like Professor Sir Stephen Powis and departmental Chief Scientific Advisers. The OCMO also had a number of regular meetings with expert colleagues. Key examples included the UK CMOs, Senior Clinicians Group, Academy of Medical Royal Colleges, Directors of Public Health, Local Action Committee Bronze/Silver/Gold as outlined below.

UK CMOs

5.189. Each nation of the UK has a Chief Medical Officer and from early in the pandemic the four CMOs worked very closely together. The 4 UK CMOs had regular meetings where we discussed technical issues, and where possible aligned the advice we were giving.

5.190. The UK CMOs first met to discuss COVID-19 on 24th January 2020 **(24th January 2020 - CJMW/134 – INQ000047552)**. In the period January 2020-February 2022 the UK CMOs met as a specific group around 274 times, initially often at short notice when there were new developments. We also attended meetings together that were not specifically UK CMOs meetings, for example the UK Senior Clinicians meetings.

5.191. The UK CMOs sometimes gave advice collectively. This was either to provide a basis for cross-UK decision-making, to give clarity across the four nations, to add strength of weight to the clinical advice or to make a clear public statement reflecting a collective clinical view. Some decisions that were seen to be almost entirely clinical were also taken by this group. These decisions and communications were made in committee generally chaired by me, and usually sent either as letters to the medical profession if clinical in nature, for example on medical regulation or clinical trials; to the general public, for example on education; or as a communication to Cabinet Office usually via email, for example on the COVID-19 Alert Levels. Below I quote fully from some of the advice that might be most helpful to the Inquiry because it covers areas which were contentious.

5.192. Examples include joint advice on:

- 9th May 2020 - Borders **(CJMW/135 – INQ000203899)**

"*The UK CMOs agreed:*

1) *Imported cases matter most when the UK has a low level of infection. When domestic transmission is very high imported cases are such a small amount of total that they are make no significant difference to the epidemic. As the UK moves to situation where local incidence and prevalence is much lower, imported cases could become a higher proportion of the overall number of infections and so preventing them can have some benefit. This is a gradual process, so there is not a 'threshold'. It is however the case that once rates of domestic transmission are low it is potentially a material issue.*

2) *That benefit only exists to a significant degree when people are coming in from a country with a higher rate of infection (chance of being infected) than the UK, and so the person being asked to self-isolate has a higher probability that they have the disease than the UK population, therefore adding to the risk. Quarantining for 14 days those people who*

come from a country with a higher rate than the UK may have a useful impact on the epidemic once the UK is at low levels, but quarantining those from countries with a lower rate than the UK will not.

3) *However, quarantining is not only, or even mostly, about the epidemiology at this stage of the COVID-19 epidemic. Wider public confidence in the response, impact on travel and trade among other issues should be considered when making policy on quarantining at the border and may be more important in policy terms. This is not for the UK CMO's to offer advice on, as it is not where their expertise lies. Points 1) and 2) they are agreed on."*

- 23rd August 2020 - Balancing risks and benefits in education: advice to the public, parents, pupils, teachers and other staff **(CJMW/116 – INQ000070464)**

  "This is a consensus statement from the Chief Medical Officers and Deputy Chief Medical Officers of England, Scotland, Northern Ireland and Wales on the current evidence of risks and benefits to health from schools and childcare settings reopening. It takes into account UK and international studies, and summaries of the scientific literature from SAGE, the DELVE Group of the Royal Society, the Royal College of Paediatrics and Child Health, and data from the Office for National Statistics. The current global pandemic means that there are no risk-free options, but it is important that parents and teachers understand the balance of risks to achieve the best course of action for their children.

  Children.

  1) We are confident that multiple sources of evidence show that a lack of schooling increases inequalities, reduces the life chances of children and can exacerbate physical and mental health issues. School improves health, learning, socialisation and opportunities throughout the life course including employment. It has not been possible to reduce societal inequalities through the provision of home-based education alone. School attendance is very important for children and young people.

2) We are confident in the extensive evidence that there is an exceptionally small risk of children of primary or secondary school age dying from COVID-19. The infection fatality rate (proportion of those who are infected who die) for those aged 5-14 is estimated at 14 per million, lower than for most seasonal 'flu infections. Every death of a child is a tragedy but COVID-19 deaths in children and teenagers are fortunately extremely rare and almost all deaths are in children with significant pre-existing health conditions.

3) We are confident that there is clear evidence of a very low rate of severe disease in children of primary and secondary school ages compared to adults, even if they catch COVID-19. The percentage of symptomatic cases requiring hospitalisation is estimated to be 0.1% for children aged 0-9 and 0.3% among those aged 10-19, compared to a hospitalisation rate of over 4% in the UK for the general population. Most of these children make a rapid recovery.

4) We are confident that there is clear evidence from many studies that the great majority of children and teenagers who catch COVID-19 have mild symptoms, or no symptoms at all.

5) There is reasonable, but not yet conclusive, evidence that primary school age children have a significantly lower rate of infection than adults (they are less likely to catch it).

6) Evidence that older children and teenagers are at lower risk of catching COVID-19 is mixed. They are either less likely to catch COVID-19 than adults or have the same risk as adults.

7) Transmission of COVID-19 to children in schools does occur. On current evidence it is probably not a common route of transmission. It may be lower in primary age children than secondary age children.

8) Control measures such as hand and surface hygiene, cohorting to reduce number of daily contacts, and directional controls to reduce face to face contact, remain key elements of maintaining COVID-19 secure school environments and minimising risk.

9) Children and young people who were previously shielding were identified on a precautionary basis at a stage when we had less data on

the effects of COVID-19 in children than we do now. Based on our better understanding of COVID-19 the great majority have now been advised they do not need to do so again, and that they should return to school. A small number of children under Paediatric care (such as recent transplant or very immunosuppressed children) have been or will be given individual advice about any ongoing need to avoid infection.

10) Our overall consensus is that compared to adults, children may have a lower risk of catching COVID-19 (lowest in younger children), definitely have a much lower rate of hospitalisation and severe disease, and an exceptionally low risk of dying from COVID-19. Very few, if any, children or teenagers will come to long term harm from COVID-19 due solely to attending school. This has to be set against a certainty of long term harm to many children and young people from not attending school.

Teachers, other school staff and parents.

11) Data from the UK (ONS) suggest teachers are not at increased risk of dying from COVID-19 compared to the general working age population. ONS data identifies teaching as a lower risk profession (no profession is zero risk). International data support this.

12) Transmission of COVID-19 to staff members in school does occur, and data from UK and international studies suggest it may largely be staff to staff (like other workplaces) rather than pupil to staff. This reinforces the need to maintain social distancing and good infection control inside and outside classroom settings, particularly between staff members and between older children and adults.

13) If teachers, other school staff, parents or wider family catch COVID-19 their risks of severe illness are similar to those of other adults of the same age, ethnicity and health status. Younger adults have a much lower risk of severe COVID-19 than older adults. The greatest risk is to those over 80 years old.

14) Current international evidence suggests transmission of COVID-19 from children of school age to parents or other adult family members is relatively rare compared to transmission from adults, but this evidence

is weak. Teenagers may be more likely to transmit to adults than younger children.

15) Children and young people should be engaged in the process of establishing COVID19 secure measures as key participants and promoters of safe communities to help protect their wider families, teachers and other school staff and other social networks. This will help reduce the risk of school outbreaks.

Impact of opening schools on wider transmission (R).

16) Because schools connect households it is likely opening schools will put some upward pressure on transmission more widely and therefore increase R. We have confidence in the current evidence that schools are much less important in the transmission of COVID-19 than for influenza or some other respiratory infections. Other work and social environments also increase risk and are likely to be more important for transmission of COVID-19.

17) The international real world evidence suggests that reopening of schools has usually not been followed by a surge of COVID-19 in a timescale that implies schools are the principal reason for the surge. There has however not been sufficient time to say this with confidence.

18) On the other hand, a local or national surge in transmission in the community may lead to an increased risk of school outbreaks occurring.

19) Opening schools may be as important in linking households indirectly as through direct transmission in school. For example allowing parents to go back to work, or meeting at the school gates, on public transport or in shared private vehicles, via after school social or sport activities or wrap around care may be as important as what happens within the school.

20) It is possible that opening schools will provide enough upward pressure on R that it goes above 1 having previously been below it, at least in some local areas. This will require local action and could mean societal choices that weigh up the implications of imposing limitations on different parts of the community and the economy.

21) Early identification and quickly managing outbreaks of COVID-19 in schools is essential as part of a local response to COVID-19. Clear advice for pupils and staff not to attend school with symptoms, and prompt availability of testing, appropriate isolation advice, and careful public health surveillance and monitoring of educational establishments are key to support the safe return to schools."

- 13th September 2021 - 12 to 15-year-old vaccination: advice to Ministers **(CJMW/125 – INQ000203916, CJMW/126 – INQ000203917, CJMW/127 – INQ000203918, CJMW/128 – INQ000066870, CJMW/129 – INQ000203920)**

  *"**Background***

  The Joint Committee on Vaccination and Immunisation (JCVI) in their advice to you on 2 September 2021 on this subject said:

  > *"Overall, the committee is of the opinion that the benefits from vaccination are marginally greater than the potential known harms… but acknowledges that there is considerable uncertainty regarding the magnitude of the potential harms. The margin of benefit, based primarily on a health perspective, is considered too small to support advice on a universal programme of vaccination of otherwise healthy 12 to 15-year-old children at this time…. JCVI is constituted with expertise to allow consideration of the health benefits and risks of vaccination and it is not within its remit to incorporate in-depth considerations on wider societal impacts, including educational benefits. The government may wish to seek further views on the wider societal and educational impacts from the Chief Medical Officers of the 4 nations, with representation from JCVI in these subsequent discussions."*

  Their full advice to you is appended in JCVI statement, September 2021: COVID-19 vaccination of children aged 12 to 15 years.

  You accepted this recommendation from JCVI, and wrote to us on 2 September 2021 stating "We agree with the approach suggested by JCVI, and so we are writing to request that you take forward work

(drawing on experts as you see fit) to consider the matter from a broader perspective, as suggested by the JCVI."

The terms of reference (ToR) of this request, which the UK CMOs agreed, can be found in Terms of reference for UK CMO advice on universal vaccination of children and young people aged 12 to 15 years against COVID-19

In doing so we have been fortunate to have been informed by the independent expertise of leaders of the clinical and public health profession from across the UK. This has included Presidents and Chairs or their representative of:

- *Royal College of Paediatrics and Child Health*
- *Royal College of General Practice*
- *Royal College of Psychiatry*
- *Faculty of Public Health*
- *Academy of Medical Royal Colleges representing all the other Royal Colleges and Faculties*
- *Association of Directors of Public Health*
- *Regional Directors of Public Health*
- *national public health specialists*
- *experts in data and modelling*

We are very grateful to them for taking considerable time and effort to consult their own colleagues in all 4 nations at short notice to get a comprehensive view of the balance of informed medical opinion and experience across the UK.

In addition, we have examined data from the Office for National Statistics as well as published data on the impact of COVID-19 on education, and other relevant published sources. We attach key published inputs in Key published inputs to the UK CMOs advice on universal vaccination of children and young people aged 12 to 15 years against COVID-19.

The UK's independent regulator of medicines and vaccines the Medicines and Healthcare products Regulatory Agency (MHRA) is in law the appropriate body to determine whether, based on risk-benefit

grounds, a vaccine is safe and effective to use and so grant a licence. They have done so for children and young people aged over 12 years for two vaccines against COVID-19, those manufactured by Pfizer and Moderna. Their assessment is that benefits exceed risks on an individual basis. We take their independent opinion as read. The MHRA position on mRNA vaccines is similar to the relevant regulatory approvals granted in the same age groups in multiple other jurisdictions including but not limited to the USA, the European Union, and Canada.

The independent JCVI is the proper body to give advice on how to deploy a vaccine which has a prior favourable risk-benefit decision and authorisation from MHRA including whether it has a sufficiently large benefit to be worth deploying on a larger, population scale. Like MHRA they consider the benefits of vaccination in this age group exceed the risks (i.e. it is better to be vaccinated than not vaccinated in this age group). They balanced the risk of COVID-19 against the risks of vaccination, including myocarditis. When forming its advice, the JCVI considered vaccine use according to clinical risk groups, thus identifying different groups according to their potential to benefit from vaccination.

For 12 to 15 year olds who do not have underlying health conditions that place them at higher risk from severe COVID-19, the JCVI considered that the size of both the risk and the benefit are at an individual level very small, and the overall advantage for vaccination, whilst present, is therefore not sufficiently large to recommend universal vaccination on their usual criteria. They deemed the extent to which vaccination might mitigate the impacts of COVID-19 on education was beyond the usual remit of the JCVI. They recognised however that given the substantial scale of the impact of COVID-19 on all children and young people, which goes beyond normal clinical benefit and risk, wider issues could, exceptionally, be relevant hence their suggestion to consult UK CMOs.

The JCVI have already recommended that children and young people aged 12 to 17 with specific underlying health conditions, and children and young people who are aged 12 years and over who are household

contacts of persons who are immunocompromised are offered two doses of a vaccine, normally Pfizer BioNTech BNT162b2. They have recommended all young people 16 to 17 are offered an initial first dose of vaccine.

The UK has benefited from having data from the USA, Canada and Israel, which have already offered vaccines universally to children and young people aged 12 to 15.

The UK CMOs start from the position that the MHRA and JCVI set out on individual benefit-risk calculations for this age group, and have not revisited this. We accept that at an individual level benefit exceeds risk but this advantage is small, and we have taken the JCVI figures as the UK current position on this question.

The Chair of the JCVI Prof. Lim has been a member of our group to ensure that there is no duplication of effort or conflict between the views of UK CMOs and the JCVI. We have been fortunate to have been joined also by the lead Deputy Chief Medical Officers for vaccines Prof. Van Tam (England), Prof. Steedman (Scotland) and Dr. Chada (Northern Ireland) and the DHSC Chief Scientific Adviser, Prof. Chappell. The final advice is that of the Chief Medical Officers, but informed by independent senior clinical and public health input from across the UK.

UK CMOs have decided in their ToR that we will only consider benefits and disbenefits to those aged 12 to 15 from vaccinating this age group, including indirect benefits. Whilst there may be benefits to other age groups, these have not been considered in our advice below.

Issues of vaccine supply were not factors considered in decision making.

The UK CMOs are aware of the extensive range of non-clinical views but this UK CMOs advice is purely clinical and public health derived and has not taken issues outside their clinical and public health remit into account. There is a subsequent political process where wider societal issues may be considered by ministers in deciding how they respond to this advice.

Advice

All drugs, vaccines and surgical procedures have both risks and benefits. If the risks exceed benefits the drug, vaccine or procedure should not be advised, and a drug or vaccine will not be authorised by MHRA. If benefits exceed risks then medical practitioners may advise the drug or vaccine, but the strength of their advice will depend on the degree of benefit over risk.

At an individual level, the view of the MHRA, the JCVI and international regulators is that there is an advantage to someone aged 12 to 15 of being vaccinated over being unvaccinated. The COVID-19 Delta variant is highly infectious and very common, so the great majority of the unvaccinated will get COVID-19. In those aged 12 to 15, COVID-19 rarely, but occasionally, leads to serious illness, hospitalisation and even less commonly death. The risks of vaccination (mainly myocarditis) are also very rare. The absolute advantage to being vaccinated in this age group is therefore small ('marginal') in the view of the JCVI. On its own the view of the JCVI is that this advantage, whilst present, is insufficient to justify a universal offer in this age group. Accepting this advice, UK CMOs looked at wider public health benefits and risks of universal vaccination in this age group to determine if this shifts the risk-benefit either way.

Of these, the most important in this age group was impact on education. UK CMOs also considered impact on mental health and operational issues such as any possible negative impact on other vaccine programmes, noting that influenza vaccination and other immunisations of children and young people are well-established, important, and that the annual flu vaccine deployment programme commences imminently.

The UK CMOs, in common with the clinical and wider public health community, consider education one of the most important drivers of improved public health and mental health, and have laid this out in their advice to parents and teachers in a previous joint statement. Evidence from clinical and public health colleagues, general practice, child health and mental health consistently makes clear the massive impact that absent, or disrupted, face-to-face education has had on the welfare and mental health of many children and young people. This is despite

remarkable efforts by parents and teachers to maintain education in the face of disruption.

The negative impact has been especially great in areas of relative deprivation which have been particularly badly affected by COVID-19. The effects of missed or disrupted education are even more apparent and enduring in these areas. The effects of disrupted education, or uncertainty, on mental health are well recognised. There can be lifelong effects on health if extended disruption to education leads to reduced life chances.

Whilst full closures of schools due to lockdowns is much less likely to be necessary in the next stages of the COVID-19 epidemic, UK CMOs expect the epidemic to continue to be prolonged and unpredictable. Local surges of infection, including in schools, should be anticipated for some time. Where they occur, they are likely to be disruptive.

Every effort should be taken to minimise school disruption in policy decisions and local actions. Vaccination, if deployed, should only be seen as an adjunct to other actions to maintain children and young people in secondary school and minimise further education disruption and therefore medium and longer term public health harm.

On balance however, UK CMOs judge that it is likely vaccination will help reduce transmission of COVID-19 in schools which are attended by children and young people aged 12 to 15 years. COVID-19 is a disease which can be very effectively transmitted by mass spreading events, especially with Delta variant. Having a significant proportion of pupils vaccinated is likely to reduce the probability of such events which are likely to cause local outbreaks in, or associated with, schools. They will also reduce the chance an individual child gets COVID-19. This means vaccination is likely to reduce (but not eliminate) education disruption.

Set against this there are operational risks that COVID-19 vaccination could interfere with other, important, vaccination programmes in schools including flu vaccines.

Overall however the view of the UK CMOs is that the additional likely benefits of reducing educational disruption, and the consequent reduction in public health harm from educational disruption, on balance provide sufficient extra advantage in addition to the marginal advantage at an individual level identified by the JCVI to recommend in favour of vaccinating this group. They therefore recommend on public health grounds that ministers extend the offer of universal vaccination with a first dose of Pfizer-BioNTech COVID-19 vaccine to all children and young people aged 12 to 15 not already covered by existing JCVI advice.

If ministers accept this advice, UK CMOs would want the JCVI to give a view on whether, and what, second doses to give to children and young people aged 12 to 15 once more data on second doses in this age group has accrued internationally. This will not be before the spring term.

In recommending this to ministers, UK CMOs recognise that the overwhelming benefits of vaccination for adults, where risk-benefit is very strongly in favour of vaccination for almost all groups, are not as clear-cut for children and young people aged 12 to 15. Children, young people and their parents will need to understand potential benefits, potential side effects and the balance between them.

If ministers accept this advice, issues of consent need to take this much more balanced risk-benefit into account. UK CMOs recommend that the Royal Colleges and other professional groups are consulted in how best to present the risk-benefit decisions in a way that is accessible to children and young people as well as their parents. A child-centred approach to communication and deployment of the vaccine should be the primary objective.

If ministers accept this advice, it is essential that children and young people aged 12 to 15 and their parents are supported in their decisions, whatever decisions they take, and are not stigmatised either for accepting, or not accepting, the vaccination offer. Individual choice should be respected."

- 31st December 2020 - Dosing schedule for vaccination: advice to healthcare professionals **(CJMW/136 – INQ000203963, CJMW/137 – INQ000203969)**

> *"Thank you for your remarkable commitment to the health of our nation in the most difficult of circumstances; the COVID-19 pandemic is undoubtedly the biggest health crisis in a generation, and certainly in our professional lifetimes. We are at a critical point in the pandemic as the emergence of a novel variant of SARS-CoV-2 with a markedly higher growth rate is rapidly shifting the epidemiological curve in the wrong direction across much of the UK in the middle of winter.*
>
> *Authorisation of first the Pfizer and now the AZ vaccine (AZD1222) for use is incredibly welcome. Both are highly effective vaccines from clinical trial data and are anticipated to have sizeable effects on preventing severe disease and hospitalisation. Getting vaccines deployed as rapidly as possible into as many older, clinically vulnerable patients, and also frontline health and social care workers is essential. The Joint Committee on Vaccination and Immunisation (JCVI) has put forward a prioritisation scheme, attached, of which you will all be aware.*
>
> *We wanted to lay out to you the scientific and public health rationale for the dosing schedule for the AZ vaccine and the change to the dosing schedule for the second dose of the Pfizer vaccine. As with all decisions during this pandemic it is about balance of risks and benefits.*
>
> 1. *We have to ensure that we maximise the number of eligible people who receive the vaccine. Currently the main barrier to this is vaccine availability, a global issue, and this will remain the case for several months and, importantly, through the critical winter period. The availability of the AZ vaccine reduces, but does not remove, this major problem. Vaccine shortage is a reality that cannot be wished away.*
> 2. *We are confident that based on publicly available data as well as data available to the JCVI, the statutory independent body, that the first dose of either Pfizer or AZ vaccine provides substantial protection within 2-3 weeks of vaccination for clinical disease, and in particular severe COVID disease. The JCVI has issued a new evidence statement today.*

3. *The second vaccine dose is likely to be very important for duration of protection, and at an appropriate dose interval may further increase vaccine efficacy. In the short term, the additional increase of vaccine efficacy from the second dose is likely to be modest; the great majority of the initial protection from clinical disease is after the first dose of vaccine.*
4. *In terms of protecting priority groups, a model where we can vaccinate twice the number of people in the next 2 to 3 months is obviously much more preferable in public health terms than one where we vaccinate half the number but with only slightly greater protection.*
5. *This is why the JCVI has recommended that first doses of vaccine are prioritised for as many people as possible on the Phase 1 JCVI priority list, in advance of second doses which will subsequently provide more assured longer-term protection. It is a classic public health approach centred on doing as much good for as many people in the shortest possible timeframe, within the available vaccine supplies, against a background of immediate disease activity and still high population sero-susceptibility (despite the disease burden seen).*
6. *The JCVI is confident 12 weeks is a reasonable dosing interval to achieve good longer-term protection.*
7. *The position is strongly supported by the UK Chief Medical Officers on public health grounds of maximising benefit.*

We recognise that the request to re-schedule second appointments is operationally very difficult, especially at short notice, and will distress patients who were looking forward to being fully immunised. However, we are all conscious that for every 1000 people boosted with a second dose of COVID-19 vaccine in January (who will as a result gain marginally on protection from severe disease), 1000 new people can't have substantial initial protection which is in most cases likely to raise them from 0% protected to at least 70% protected. Whilst the NHS, through all of your work, has so far vaccinated over 1 million UK patients with a first dose, approximately 30 million UK patients and health and social care workers eligible for vaccination in Phase 1 remain totally

unprotected and many are distressed or anxious about the wait for their turn. These unvaccinated people are far more likely to end up severely ill, hospitalised on in some cases dying without vaccine. Halving the number vaccinated over the next 2-3 months because of giving two vaccines in quick succession rather than with a delay of 12 weeks does not provide optimal public health impact.

We have to follow public health principles and act at speed if we are to beat this pandemic which is running rampant in our communities and we believe the public will understand and thank us for this decisive action. We hope this has your support.

We attach a statement from the JCVI laying out their thinking in more detail."

- 1st April 2020 - Clinical trials for treatments to NHS colleagues **(CJMW/138 – INQ000068589)**

  "We are writing to ask that every effort is made to enrol COVID-19 patients in the national priority clinical trials; there are trials in primary care, hospital settings and ICUs.

  As yet, there are no proven treatments for Covid-19. We need to gather reliable evidence through clinical trials. Using international evidence and UK expertise the most promising potential treatments, at this stage, have been identified and the UK is running national clinical trials to gather evidence across the whole disease spectrum.

  The key three national trials are:

  ***PRINCIPLE** (higher risk patients in primary care trial). www.principletrial.org*

  ***RECOVERY** (in hospital trial) https://www.recoverytrial.net/ For further information please email: recoverytrial@ndph.ox.ac.uk*

  ***REMAP-CAP** (critically ill patient trial) https://www.remapcap.org/ For further information please email: ukremap-cap@icnarc.org*

  Other priority studies, including observational studies, are listed here

  https://www.nihr.ac.uk/covid-19/urgent-public-health-studies-covid-19.htm

These trials are being run as simply as they can to reduce the burden on the NHS, with adaptive designs so further treatments can be added if new promising candidates are identified. The results are essential to the future treatment of UK and global patients. We will ensure important results are disseminated rapidly to improve practice.

The faster that patients are recruited, the sooner we will get reliable results. While it is for every individual clinician to make prescribing decisions, we strongly discourage the use of off-licence treatments outside of a trial, where participation in a trial is possible. Use of treatments outside of a trial, where participation was possible, is a wasted opportunity to create information that will benefit others. The evidence will be used to inform treatment decisions and benefit patients in the immediate future.

Any treatment given for coronavirus other than general supportive care, treatment for underlying conditions, and antibiotics for secondary bacterial complications, should currently be as part of a trial, where that is possible."

- 4th December 2020 - Winter challenges **(CJMW/139 – INQ000072041)**
- 11th December 2020 - Self-isolation period **(CJMW/140 – INQ000203967)**
- 14th December 2021 - 15 minute wait for vaccines **(CJMW/141 – INQ000203961)**
- 30th January 2020 - Risk from COVID-19 **(CJMW/055 – INQ000203938)**
- 24th February 2021 - Alert levels **(CJMW/142 – INQ000072901)**

5.193. This is just a small sample of the advice that the UK CMOs gave together. We also aimed to give the same advice independently, within our own nations, having discussed and come to the same scientific conclusion. There were no instances I can recall where there was a significant scientific disagreement between UK CMOs although we often tested one another's thinking. Given the extent and range of advice provided and the difference of context there may be some instances where internally the points of emphasis were different.

UK Senior Clinicians Group

5.194. The UK Senior Clinicians Group was a group where senior clinical colleagues from across Government came together to discuss technical issues. It was a not a decision-making group but designed as a place for rapid informal information sharing and discussion between clinical experts in different parts of the system **(CJMW/143 – INQ000203910**). It was conceptualised on 26th February 2020 **(CJMW/144 – INQ000047880)**. Initially it brought together OCMO, PHE and the NHS, but it expanded to include further clinicians including the other UK CMOs.

5.195. The UK Senior Clinicians Group met for the first time on 4th March 2020. It was called the Tripartite Senior Clinicians Group at that point (CMO NHSE PHE).

5.196. Between January 2020 and February 2022 the group in some form met around 70 times. They met around 64 times with UK CMOs in attendance. Usually I chaired.

Academy of Medical Royal Colleges and Directors of Public Health

5.197. In order to provide collective leadership to the public health profession and the wider collective leadership of the medical profession, the OCMO has regular meetings with Directors of Public Health (DPH) from around the country and separately with the Presidents and Chairs of the Medical Royal Colleges and with other senior clinicians. There were information sharing meetings where I or a DCMO gave a summary of the COVID-19 situation from our view and Directors of Public Health provided local intelligence and their own experiences.

5.198. The Presidents or Chairs from the Royal Colleges set out in such meetings what they knew from their membership, asked questions and challenged when they felt this was appropriate. This allowed a two-way professional dialogue between the medical profession and the medical advisers in Government.

5.199. The first meeting with Royal Colleges was on 30th January 2020. I met with Royal Colleges around 59 times between January 2020 and February 2022.

5.200. Meetings with Directors of Public Health (DPHs) on COVID-19 were conceptualised on 29th January 2020. The first meeting was on 31st January 2020. I met with DPHs around 71 times between January 2020 and February 2022. The DPHs were therefore able to hear early internal Government thinking in a confidential environment, challenged when needed and asked questions and gave local views.

Local Action Committee - Bronze/Silver/Gold

5.201. OCMO also played a key role in the internal advice structure for COVID-19 surveillance that the DHSC set up. This structure was called the Local Action Committee (LAC) or Bronze/Silver/Gold- the latter a reference to the different levels of LAC meetings. The Bronze and Silver parts of this structure were technical and expert in nature.

5.202. The OCMO played a key role in the LAC command structure, which was set up by the Joint Biosecurity Centre (part of Test of Trace) at the request of the Secretary of State for Health and Social Care. There were Bronze, Silver and Gold LAC meetings each week. Bronze was a working level meeting with regional teams, I did not attend. I chaired most of the Silver committee meetings which generally happened weekly from 9th June 2020. This was a technical meeting to present, assess and challenge interpretation and consistency of data, analyses and recommendations from Bronze. Silver made technical recommendations to Gold which was chaired by the Secretary of State for Health and Social Care. I attended most Gold meetings. There were exceptional Silver and Gold meetings if a situation required urgent attention. The decisions on localised restrictions, including the Tiers, were made through this process – resulting in recommendations made by the Secretary of State to a COVID-O (central ministerial decision making meetings run by Cabinet Office) meeting. More information relating to the LAC process and its inputs is in the COVID-19 contain framework **(CJMW/145 – INQ000223952)**.

5.203. There was also a Joint Biosecurity Centre Technical Board, chaired by the UK CMOs on a rotating basis, who provided oversight and expert challenge to the public health and scientific methodology on issues such as the assessment process for the COVID-19 Alert Level.

International

5.204. I and the DCMOs interacted with peers and experts internationally in informal groups, bilaterally and via the WHO or via regional groupings throughout the pandemic to learn and share expertise and experience. PHE (subsequently UKHSA) also had very good bilateral and multilateral relationships from which we learned. The GCSA also had international meetings on COVID-19 many of which I attended. WHO set up a structure for international peers to meet which especially early in the pandemic was very useful for getting a quick understanding of current epidemiology in advance of publications.

They also provided bilateral meetings. As the pandemic progressed informal but regular meetings with peers facing similar challenges across Europe, North America and around the world were set up.

5.205. In the initial phases of the global pandemic when the majority of infection was in East Asia, scientists from around the world, including the UK, learned from scientists in China, South Korea, Singapore and Japan among others. When the UK had the first major outbreak of the Alpha variant scientists from other countries contacted UK Government scientists to get an early understanding of this new threat and PHE provided group briefings. In turn, scientists from India provided important information on the Delta variant in advance of publications, and scientists from South Africa gave us invaluable advice on Omicron on a bilateral basis as well as via international fora. The extent of international interaction between Government scientists was considerable. These scientists were often leading their own national response at the leading edge of the pandemic as well advising their international peers who were further behind any given epidemic curve. This started with the clinical and scientific advice given bilaterally and multilaterally by scientists from China in the initial few weeks which was essential to the international and UK response. We were very grateful to our international colleagues for their help and advice.

5.206. Between January 2020 and July 2020, I had around 44 meetings on COVID-19 which were international in nature, this included individual meetings with representatives from the following countries: China, Singapore, Hong Kong, France, Canada, USA, Japan, Italy, Netherlands, South Korea, Sweden, Germany, Switzerland and Spain. This included the international experts listed below:

- Dr Tedros Ghebreyesus (WHO)
- Sir Mark Lowcock (UN)
- Dr Hans Kluge (WHO, EURO)
- Dr David Nabarro (WHO)
- Dr Liang Wannian and Professor George Gao (China)
- Professor Chorh Chaun Tan (Singapore)
- Professor Gabriel Leung (Hong Kong)
- Professor Oh and Professor Choi Eun Hwa (South Korea)
- Professor Hitoshi Oshitani and Dr Takahiro Ueyama (Japan)

- Professor Silvio Brusaferro (Italy)
- Professor Christophe Denfert and Professor Bruno Hoen (France)
- Dr Fernando Simon (Spain)
- Dr Theresa Tam (Canada)
- Professor Jaap van Dissel (Netherlands)

5.207. As well as meetings with individual countries I also attended around 17 WHO meetings which were multi-country in nature. Other international meetings included meetings with the G7.

5.208. Between August 2020 and February 2022, I had a further 107 international meetings, including with Dr Anthony Fauci (USA), Dr Rochelle Walensky (CDC USA), Professor Lothar Wieler (Germany), Professor Tulio de Oliveira and others (South Africa), Professor Vijay Raghavan (India), Professor Paul Kelly (Australia), Dr Caroline McElnay (New Zealand), Dr Theresa Tam (Canada) and Admiral Rachel Levine (USA).

Advice to clinicians

5.209. As I have explained above, together with Professor Powis (NHSE) and Professor Peacock (PHE), I sent a number of Clinical Alert System (CAS) alerts with advice to clinical staff. The first of these was on 23rd January 2020 **(CJMW/047 – INQ000047537)**. This advice, which provided a case definition for clinical practitioners to use to identify those most likely to have COVID-19 was updated frequently, as the virus spread further around the globe **(31 January 2020 - CJMW/057 – INQ000068530, 3rd February 2020 - CJMW/060 – INQ000068531, 7th February 2020 - CJMW/062 – INQ000087249, 25th February 2020 - CJMW/067 – INQ000068537, 5th March 2020 - CJMW/070 – INQ000068538, 10th March 2020 - CJMW/071 – INQ000203878, 12th March 2020 - CJMW/073 – INQ000048070)**. The dates and a summary of what was in the CAS alerts are listed above in the timeline section. During the course of the pandemic clinical colleagues and I sent further communications to the clinician profession on a range of topics. An example of these are listed in the joint advice from the UK CMOs section **(CJMW/138 – INQ000068589, CJMW/139 – INQ000072041)**.

5.210. As already set out, I also had regular (often weekly) meetings with the Presidents and Chairs of the Medical Royal Colleges and separately the Directors of Public Health to

ensure two-way communication, and *ad hoc* meetings with groups including the BMA when relevant. I communicated also via scientific meetings and the specialist media (e.g. BMJ) in addition to local visits when that was possible, including to the Newcastle Royal Victoria Infirmary on February 19th 2020 where the first 2 patients who tested positive were treated to get the clinical insights of the treating clinicians.

Advice to the public

5.211. The CMO has always had a public-facing role to inform the public of health issues, although this was far more prominent during COVID-19 than is typical. In this pandemic the DCMOs and I provided explanations to the public to help them understand and respond to COVID-19.

5.212. Our view was and is that accurate, timely, balanced information was reasonably expected by the public, including data of a technical nature. This included putting risk in context.

5.213. The DCMOs and I played a role in public communication, as did other clinicians, appearing alongside the Prime Minister and other Ministers as well as the GCSA during the press conferences broadcast on national television. At the request of Ministers, we separately attended some press briefings of a technical nature, including ones I attended with the GCSA and that Professor Van-Tam attended on vaccines.

5.214. During the pandemic the OCMO therefore gave regular advice directly to the public including during press conferences and pooled press clips, in written form (statements or letters) published on GOV.UK, via Twitter **(CJMW/146 – INQ000203954)**, in Select Committee hearings picked up by the media **(19th December 2022 - CJMW/147 - INQ000203968, CJMW/148 - INQ000203966, CJMW/149 - INQ000203951, CJMW/150 - INQ000203958, CJMW/151 - INQ000064521, CJMW/152 - INQ000203953, CJMW/153 - INQ000203952, CJMW/154 - INQ000203957, CJMW/155 - INQ000203964, CJMW/156 - INQ000203956, CJMW/157 - INQ000203949, CJMW/158 - INQ000203962, CJMW/159 - INQ000064527, CJMW/160 - INQ000203983, CJMW/161 - INQ000203992)**, in published articles and through national advertisements or media **(18th March 2020 - CJMW/162 – INQ000203923, 25th March 2020 - CJMW/163 – INQ000203924, 14th December 2021 - CJMW/164 – INQ000203925)**.

5.215. At times I tried to give long-form information for members of the public who wanted more detail, for example a Gresham lecture on COVID-19 given over YouTube on 30th April 2020 **(CJMW/165 – INQ000203926)**, or one on vaccination given 10th February 2021 **(CJMW/166 – INQ000203927)**. These tried to present a clear view on what was and was not known at the time they were given to those who wanted more detail. In all of these I tried to make clear that the scientific understanding would change with time.

5.216. Regarding UK Government messaging, communication experts rightly provided advice on this. This is not within the OCMO's area of expertise. We did however make points around communication in terms of translation to ensure technical accuracy and that clinical meaning was not lost or unintentionally distorted **(31st January 2020 - CJMW/167 – INQ000047642)**.

5.217. Several areas listed in the Inquiry's request are not areas in which the OCMO has expertise. These include addressing disinformation, UK Government messaging and assessing the impact on public confidence of breaches of rules. The Government does have expertise in these areas, but that expertise does not sit in OCMO.

5.218. When involved in public communication OCMO attempted to counter health disinformation, for example on vaccine safety, entirely by giving accurate information rather than directly countering (and thus potentially amplifying) deliberate or accidental disinformation.

5.219. Clearly any action that reduces public adherence to or which undermines public confidence in measures that control the spread of the virus is not good for public health.

Research

5.220. OCMO played a part in preparing the UK to respond to COVID-19 in the long term by taking action to set up research from the earliest stage of the pandemic, as laid out above, including convening funding, setting up rapid research panels, providing strong encouragement to clinicians to take part in research and ensuring research was built into the national response from the start (contain, delay, research, mitigate). We understand this is likely to be the subject of a future Module but given its importance to the policy move from non-pharmaceutical to medical countermeasures I give a brief overview here.

5.221. As we observe in the introduction to Chapter 3 of the Technical Report published on 1st December 2022:

"In all pandemics and major epidemics the initial response depends on sparse information, and in the case of a new pandemic such as COVID-19 there will often be no proven medical countermeasures. The key purpose of research is to understand the disease itself, to improve information for policy and clinical decision making, to optimise existing clinical treatment and to provide the tools to move from social to medical countermeasures. The central role of research in supporting the response is sometimes underestimated by non-medical planners and policymakers. Since the mid-19th century science has always been, and will almost always be, the exit strategy from pandemics and epidemics." **(CJMW/001 – INQ000203933)**.

5.222. In my role as DHSC CSA and head (CEO) of NIHR I played a significant role in the Government approach to research into COVID-19 in addition to my CMO role. The OCMO both set up research calls and provided a bridge between researchers and Government to ensure the most useful research was carried out to inform policy. Professor Van-Tam also took a leading role in this area, and the GCSA was also heavily involved. Our greatest concerns were that research would not be fast enough (as was generally the case during the influenza pandemic in 2009), or that multiple, competing, underpowered, studies would be launched which failed to reach their endpoints, and so yield inconclusive findings. Our actions were intended to reduce those risks and harness the substantial research excellence in the UK.

5.223. The UK has a centralized health delivery system through the National Health Service (NHS), and two major Government funders of clinical research: the National Institute for Health Research (NIHR) of which I was the head, and the Medical Research Council (MRC) part of UK Research and Innovation (UKRI) with which we worked closely and often jointly funded. Additionally the UK has a strong research charity sector including the Wellcome Trust as well as several other major research charities. It was therefore well situated for the Government funders of research, NIHR and MRC, to coordinate which research was prioritized, and use the NHS and existing NIHR networks to deliver this. It was important to the UK's research response that we have previously existing clinical funders, with significant budgets, well-established ways of working, effective ethical review and regulators (HRA and MHRA), and a strong clinical research culture.

5.224. In addition to the public funders the UK also has a vibrant life sciences industry.

5.225. The UK also had the United Kingdom Vaccines Network. It was established in 2015 after the Ebola crisis in West Africa to address the perceived lack of incentive for the pharmaceutical industry to investigate the development of vaccine for intermittent infectious disease outbreaks and epidemics in low income countries. I chair the UKVN, and have done so since its inception. Recognising the risk posed by coronaviruses in 2016 the UKVN funded Oxford University with a grant of £1.87m to develop a vaccine for MERS. It was this technology that was used to develop the Oxford/AstraZeneca vaccine for COVID-19. The UKVN is Overseas Development Assistance (overseas aid budget) funded and was designed for funding products predominantly likely to benefit low income countries (i.e. not the UK as the principle beneficiary).

5.226. In January 2020 it was still unclear what the impact of COVID-19 would be, but it was clear to OCMO that if it did become a pandemic research of multiple forms would be key in the response over the course of the pandemic. The OCMO team worked with the United Kingdom Vaccines Network (UKVN) team in DHSC, NIHR and UKRI to launch a rapid response research call **(CJMW/168 – INQ000047636, CJMW/169 – INQ000047637, CJMW/170 – INQ000047587)**. Speed was important so the research call went live on the 4th February 2020 **(CJMW/171 – INQ000047670, CJMW/172 – INQ000047676)**. The deadline for the first part (vaccines and treatments) was 13th February. The deadline for the second part (any other COVID-19 research) was 27th February **(CJMW/173 – INQ000047681)** 2020. Professor Van-Tam briefed the panel on the epidemiological situation and what kind of research (policy relevant research) was needed so that the research chosen would be the most likely to help **(CJMW/174 – INQ000047784)**. This first call funded the RECOVERY trial and the Oxford/AstraZeneca vaccine **(23rd March 2020 - CJMW/175 – INQ000203986)**. A total of 26 projects were funded at a cost of approximately £26 million. After the initial call a second rolling research call was opened, where applications were made and decided upon in a rolling fashion. Four highlight notices on ethnicity, mental health, seroprevalence and transmission were issued to seek proposals on these specific topics, aimed at research for public health benefit within 12 months. Overall, the rolling call led to commissioning of approximately 50 studies at a cost of approximately £50 million.

5.227. Many of these studies proved central to the UK response- examples include:

- The RECOVERY trial- studying treatments for hospitalised patients.
- The PRINCIPLE trial- treatments in primary care.

- Preclinical and clinical trials of the Oxford/AstraZeneca vaccine and developing manufacturing processes at scale.
- PHOSP-COVID- national consortium to understand and improve long-term health outcomes.
- Research and surveillance on COVID-19 using the OpenSAFELY platform
- ISARIC- Comprehensive data of patients in hospital.
- UK-REACH- study into ethnicity and COVID-19 outcomes in healthcare workers.
- Understanding the dynamics and drivers of the COVID-2019 epidemic using real-time outbreak analytics.

5.228. OCMO also readied the research system to respond across the board by ensuring that the existing infrastructure was pivoted to respond to COVID-19 **(24th January 2020 - CJMW/176 – INQ000047546)**. One way in which this was done was that NIHR set up a prioritisation process. Trials, observational studies and other research studies we considered of particular importance for clinical practice, public health or policy were designated 'Urgent Public Health badged' (UPH) by an independent expert panel, which I signed off as CMO. This focused the research workforce on a smaller number of trials and other studies that resulted in larger recruitment across a narrower remit; therefore, key trials and other studies were able to achieve end points which were adequately statistically powered. UPH badging also meant Health Research Authority (HRA) and Medicines and Healthcare Products Regulatory Agency (MHRA) regulatory approval was expedited. About 1,600 applications in total were received, with 101 studies UPH approved. Targeted support from the NIHR research infrastructure was important for commercial trials, such as the Novavax vaccine, as well as for publicly funded ones. The NIHR Clinical Research Network (CRN) supported recruitment of over a million patients from all across the UK into Urgent Public Health studies (Mar 20–Mar 21). The UPH process did, by necessity, mean that other studies got less support from NIHR sources.

5.229. Following a review of the 2009 pandemic influenza outbreak, the NIHR commissioned a portfolio of projects, put on stand-by in a maintenance-only state and awaiting activation in the event of new influenza pandemic. The portfolio included studies

covering surveillance, communications, triage, and clinical management. Some of those sleeping contracts were stood up and repurposed for COVID-19. This included:

- Evaluating and improving communication with the public during a pandemic, using rapid turnaround telephone surveys
- Pandemic Respiratory Infection Emergency System Triage
- Maternal and perinatal outcomes of pandemic influenza in pregnancy
- Real time refinement and validation of criteria and tools used in primary care to aid hospital referral decisions for patients of all ages in the event of surge during an influenza pandemic
- The ASAP trial (a double-blinded randomised controlled trial of early low dose steroids in patients admitted to hospital with influenza infection during a pandemic) was not activated but the study protocol was used to inform the dexamethasone arm of the RECOVERY trial.

5.230. In the early stage of the pandemic, given the uncertainty, there was significant pressure to use drugs that were unproven. Understandably political leaders and clinicians wanted to do something that might help people immediately. The OCMO played a key role in ensuring there was an early emphasis on confining treatments to proven treatments or clinical trials, rather than going to emergency use with unproven therapies. The UK CMOs wrote to colleagues to urge enrolment in clinical trials and supported this approach internally in Government **(1st April 2020 - CJMW/138 – INQ000068589, 6th May 2020 - CJMW/177 - INQ000069096, 6th May 2020 - CJMW/178 -INQ000069095)**:

> *"While it is for every individual clinician to make prescribing decisions, we strongly discourage the use of off-licence treatments outside of a trial, where participation in a trial is possible. Use of treatments outside of a trial, where participation was possible, is a wasted opportunity to create information that will benefit others. The evidence will be used to inform treatment decisions and benefit patients in the immediate future."*

5.231. Professor Van-Tam who had worked on FLU-CIN, a network of hospital surveillance for flu, set in train work to stand up CO-CIN, a network of hospital surveillance for COVID-19. Over the course of the pandemic before standing down it recruited over 300,000 patients. It provided the first open-access comprehensive clinical-epidemiological data at scale in the pandemic, reporting weekly to DHSC and SAGE.

CO-CIN reports and papers fed into 80 SAGE meetings, 72 NERVTAG meetings, and many subgroups. All nations public health agencies were given direct access to the raw data. Aggregate data was shared with WHO, the US CDC and ECDC in Europe.

5.232. In the March 2020 Budget Her Majesty's Treasury (HMT) provided the NIHR with £30 million of new funding to enable further rapid research into COVID-19. This was colloquially known as the 'fighting fund'. This could be spent with joint agreement from myself and the GCSA. The idea was that given the health emergency there would be some discrete pieces of research or related work that needed to be done so rapidly that it was not possible to fund them through the normal mechanisms, so this alternative funding was used. Work funded through this route included:

- £9.9m for clinical trials phase 1 and 2 of the Oxford Vaccine.
- £9.5m for CO-CIN to collect data for hospitalised COVID-19 patients.
- £8.5m for the COVID-19 Genomics UK Consortium (COG-UK) - to deliver large scale, rapid sequencing of the disease to monitor changes in the virus to see if new variants emerge.

5.233. The timeline for the research response is below for ease, as well as above in the section on initial response.

- 4th February- Rapid response research call went live. Deadline for first part 13th February. Deadline for second part 27th February.
- 2nd March- Rapid response research call assessment panel met for first part of call. (vaccines and therapeutics).
- 17th March- Rapid response research call assessment panel met for second part of the call (wider research).
- 19th March- First patients recruited onto RECOVERY
- 23rd March– Rapid response research call: 6 first projects formally announced. (note that researchers told before this and started research). Included £2.1m for RECOVERY and £2.6m for Oxford Vaccine.
- 24th March- 10th patient recruited to RECOVERY.
- 27th March- 100th patient recruited to RECOVERY.
- 3rd April- 1000th patient recruited to RECOVERY.

- 1st April- UK CMOs and Professor Powis send letter to clinicians asking for every effort to be made to enrol COVID-19 patients in clinical trials, not to use treatments outside of a trial
- 17th April- second wave of projects announced (note that researchers were told before this date and started the research).

5.234. The speed of action in setting up early research meant that results were delivered earlier than they otherwise would have been. Because the RECOVERY clinical trials platform was set up ahead of the first wave it was able to recruit at large scale by international standards and showed by June 2020 that dexamethasone reduced COVID-19 mortality, reducing deaths by about one-third in ventilated patients and by one fifth in other patients receiving oxygen only. This was the first drug shown to do so. The speed of that discovery saved substantial numbers of lives in the UK, and internationally. Dexamethasone had the advantages of being well known to all clinicians, relatively safe, widely available and cheap, giving global applicability. RECOVERY has as of December 2022 recruited just under 50,000 patients.

5.235. OCMO (Professor Van-Tam and me in the main) played a role on the research aspects of COVID-19 throughout the time period of Module 2. This includes at the start of the time period with RECOVERY, PRINCIPLE and RE-MAP CAP, and in later stages key studies on vaccines including National Immunisation Schedule Evaluation Consortium (NISEC) studies such as COV-BOOST, COM-COV and COV-FLU and further treatment trials such as PANORAMIC.

5.236. NIHR continued to fund important COVID-19 research throughout the later period of concern to this Module. Examples include an NIHR and UKRI jointly funded open call which was launched in the autumn of 2020, which focused on understanding Long Covid in the community. Four studies were commissioned at a cost of £18.5m. Successful projects were announced on 18th February 2021. A second open call, this time funded just by the NIHR and also on non-hospitalised patients, was launched in the spring of 2021, and focused on treatments and interventions, diagnostics and service delivery. This resulted in a further fifteen studies being funded, at a cost of £19.6m. These were announced on 18th July 2021.

5.237. The above summary gives some indication of the research activity driven and supported by the OCMO directly or indirectly. Further detail can be found in the Technical Report **(CJMW/001 – INQ000203933)**.

5.238. OCMO also played a role in advice around procurement of vaccines, vaccine delivery consumable, refrigeration infrastructure, and clinical treatments. These were procured rapidly and at risk (given it was not known which or if treatments or vaccines would work), which was essential, given international shortages, and Professor Van-Tam played an important role here in support of the Vaccines Taskforce and others.

Variants

5.239. All viruses mutate over time, so it was likely that new variants of COVID-19 that differed to the original 'wild-type' strain would emerge over time. The rate of change varies considerably between different viruses. Most of the time the changes are so small that they have little impact on the virus, or disadvantage the virus, but sometimes the virus mutates in a way that provides it with an advantage. These then may become dominant. This might occur by virtue of greater transmissibility or, as immunity accumulates due to vaccination and prior infection, it might mean immune-evading, or both. Where drugs are widely used, as in HIV, they may also evolve to escape those drugs.

5.240. When public health officials assess that a mutation might have significant characteristics such as increased transmissibility, severity or ability to infect a person this was designated a Variant of Concern (VOC). The key VOCs during the time period were:

- Alpha (B.1.1.7) designated a VOC by the WHO on 18th December 2020. Alpha first emerged in the South-East of England, was significantly more transmissible than the original Covid-19 variant and had global impact.
- Beta (B.1.351) designated a VOC by the WHO on 18th December 2020. Beta emerged in Southern Africa.
- Gamma (P.1) designated a VOC by the WHO on 11th January 2021. Gamma emerged in Brazil.
- Delta (B.1.617.2) designated a VOC by the WHO on 11th May 2021. Delta emerged in India, and dominated globally in 2021. Delta was intrinsically more transmissible than previous variants and showed some immune escape.
- Omicron (B.1.1.529) designated a VOC by the WHO on 26th November 2021. Omicron emerged in Southern Africa. It had a large number of mutations and

from early data a more sizeable immune escape. Omicron dominated from then to the end of the time period (February 22nd) and various strains of Omicron (BA2, BA4/5 and others) continue to dominate as this statement is written (December 2022 to July 2023).

Where a virus emerged and was first detected is not necessarily where it first evolved.

5.241. The response to any variant is specific, and often highly technical at the start, to understand the mutations and their likely implications. There are many variants and assessing which are going to go on to dominate based only on mutation data and initial spread is difficult. If a variant does dominate then the response to the variant quickly becomes the response to COVID-19 in general.

5.242. The OCMO played a role in gathering early intelligence on new variants as they emerged and often spoke to expert colleagues in other countries as part of that. This included:

- On 27th April 2021 GCSA and I met with Professor Vijay Raghavan, the Principal Scientific Adviser to the Government of India to learn about Delta. We met again on the 25th May 2021.
- On 8th December 2021, I met with Dr Michelle Groom, Head, Division of Public Health Surveillance and Response and Dr Waasila Jassat, Public Health Specialist at the National Institute for Communicable Diseases and others in South Africa to learn about Omicron. We met again on 14th December 2021, with a wider cast list including GCSA and further South African technical experts. We met again on 17th December 2021.

5.243. The OCMO played a role in support of PHE and subsequently UKHSA which had the technical lead in ensuring Ministers were aware of emerging data on new variants. For example between 26th November and 30th December 2021 I had around 27 formal meetings with the Secretary of State for Health and Social Care on Omicron. Professor Van-Tam and Professor Harries also were involved in many discussions on variants.

5.244. The first variant of concern, Alpha, emerged in the UK. The process for initially assessing the threat once a VOC was identified shows the escalation from PHE and NERVTAG through to Secretary of State via technical discussions **(CJMW/179 – INQ000072143)**. In January 2021 a Variant Technical Group was set up by PHE **(CJMW/180 – INQ000203912)**, their technical briefings are available online.

5.245. Subsequent variants of concern were imported and much of the discussion between experts and within Government was on how to slow the rate of importation.

Section 6: Some additional specific areas

6.1. I set out above the role of OCMO during the pandemic, a range of the advice given and to whom. The Inquiry has also asked for an overview of some specific areas, which is outlined briefly below. Much greater detail on these areas and a wider overview of the science of COVID-19 is contained in the recently published Technical Report by the CMOs, GCSA, NHS National Medical Director and DCMOs on COVID-19 previously exhibited **(CJMW/001 – INQ000203933)**; what follows is a summary of a few key points. The Report should be seen as the best source for most technical questions. I will also expand on several of these points in my personal witness statement for Module 2.

Routes of transmission

6.2. How and at what point in the illness an infection transmits is important in how to respond to it as the initial countermeasures which are useful for an emerging infection depend on the route of transmission. The five main routes of transmission capable of sustaining a pandemic or major epidemic are: respiratory (influenza, COVID-19); sexual and intravenous (HIV); oral from water or food (cholera, typhoid); vector transmitted from insects or arachnids (plague, malaria, dengue, typhus, Zika) and touch (Ebola, Lassa).

6.3. Some infections have a dominant route of transmission and secondary routes. For example plague has both a respiratory and a vector-borne route; Zika has a secondary sexual route.

6.4. In the case of COVID-19 it was established at an early stage that the dominant route was respiratory. It was assumed that touch (to mucus membranes) and possibly faeco-oral were potential secondary routes. In the case of respiratory transmission, this can involve the generation of particles from a few microns in diameter to several hundred microns in diameter. Particles of different sizes have different ballistic and other characteristics and the extent to which one size range dominates can be a very important factor in transmission and therefore countermeasures. It is very rare that one size range dominates entirely and there will be inter-individual variation. Determining

particle size emissions involves highly specialised aerobiological studies and is never known at the point when a novel respiratory virus emerges.

6.5. Non-pharmaceutical countermeasures have to be based on the route of transmission, mortality rate, and the age structure of disease, among other factors. To take a practical example: the last major pandemic to affect humans was HIV, a sexually and intravenously transmitted infection which infected predominantly young adults who remained infectious over many years. None of the societal measures that help control HIV such as condom use would have any impact on COVID-19, and the measures that were used for COVID-19 (home working, facemasks, reducing the numbers of people entering care homes etc.) would have almost no impact on an HIV epidemic.

6.6. One area of transmission where the central view in the UK and internationally (e.g. WHO) changed over the early pandemic was the relative contribution of droplet spread (usually at quite close quarters of a few meters) and aerosol spread (capable of infecting at a distance). Both are respiratory but this has implications for potential countermeasures. The relative contribution of aerosol was understood to be greater as time went on, but this was a gradual accumulation of evidence. This is covered in more detail below.

R number and growth rate

6.7. The reproduction number (R) is the average number of secondary infections produced by 1 infected person. If R is over 1 then the number of infections is increasing (e.g. doubling, growing exponentially, although at variable rates). If R is under 1 then the number of infections is decreasing and if sustained the epidemic will shrink. R changed over time depending on the interactions between people and the characteristics of the variant and the environment. It is an important measure of a pandemic as it signifies whether cases are growing or shrinking. The R number was estimated by SPI-M-O and published by SAGE. It was then estimated by the Epidemiology Modelling Review Group (EMRG) and published by UKHSA online, alongside a more detailed explanation of R and a timeseries of the R number **(15th May 2020 CJMW/181 – INQ000203987)**. A major aim in the early pandemic was to ensure R for COVID-19 moved from above 1 (growing, doubling) to below 1 (shrinking, halving). If this had not been achieved the initial wave would have carried on growing.

6.8. As the guidance above sets out the growth rate is also a useful measure of the pandemic. The growth rate also tells you how the number of new infections is shrinking or growing. A growth rate of between 3% and 6% over X (often weekly) means that the number of new infections is growing by between 3% and 6% over a specified period of time. R alone does not tell us how quickly an epidemic is changing. Different diseases with the same R can generate epidemics that grow at very different speeds. For instance, 2 diseases, both with R=2, could have very different lengths of time for 1 infected individual to infect 2 other people; one disease might take years (e.g. leprosy), while the other might take days (e.g. 'flu). The growth rate provides information on the size and speed of change.

6.9. The doubling time (if R above 1) and halving time (R below 1) are key measures of how rapidly an epidemic is growing or subsiding. All epidemics are either doubling or halving. Doubling time is more intuitive than the growth rate as a doubling time of 1 week means, by definition, that the current number of cases will be twice that size in 2 weeks, 4 times that size in 3 weeks and 8 times in 4 weeks. This helps people understand quite how rapidly exponential growth increases absolute numbers infected. Early in the pandemic and early in some subsequent waves doubling times were measured in days.

6.10. The principle aim of Government action early in the pandemic, and then when it was expanding, was to get R down to, and then below 1 (i.e. to get the wave to peak and shrink).

Social distancing

6.11. Social distancing measures aim to reduce the chance that an infected person, whether or not they have symptoms and are aware of their status, can infect another person especially from a different household. This is achieved either by ensuring they do not meet others from another household (working from home, closing hospitality venues, restrictions in schools), or that if they do meet that the risk of infection passing between them is significantly reduced (meeting outside, at a distance, facemasks). To have impact social distancing measures must apply to all or a sizeable part of the population. SAGE provided considerable advice on social distancing, including here **(14th April 2020 - CJMW/182 – INQ000203990)** and here **(6th May 2020 - CJMW/183– INQ000203981)**. I also set out some principles to consider when reviewing the balance

of risk for the 2m figure for social distancing **(14th June 2020 - CJMW/112 – INQ000069679)**.

6.12. Working from home was an example of one of the measures looked at by SAGE early in the time period and was part of many of the packages of interventions used. SAGE considered it to have a fairly sizeable impact **(14th October 2021 - CJMW/184 – INQ000203980)**, especially in proportion to any disruption it caused.

6.13. The Technical Report sets out greater detail on social distancing and wider non-pharmaceutical interventions in Chapter 8 **(CJMW/185– INQ000203972)**.

Self-isolation

6.14. Self-isolation is an example of reducing person to person contact with someone who knows, or suspects, they are infected, or is at higher risk of developing the infection. This may be through testing (proven case) through symptoms (possible case) or as a recent contact of a case (contact-tracing). In all of these situations there is a considerably greater risk that the person is infectious than the general asymptomatic population, so they need to take all practical measures to avoid meeting others in a way an infection may occur. Usually this is for a specific period of time during which they are potentially infected, or until testing shows they are no longer infectious.

Herd / population immunity

6.15. In diseases for which long-lived immune protection from infection is achieved it is possible for immunity to increase in the population through natural infection but by definition this means all those immune naïve individuals infected carry all the risks of the disease. Mathematically the more transmissible an infection the higher the proportion of the population that needs to be immune to achieve significant population immunity.

6.16. There are numerous diseases for which full population immunity (sometimes called herd immunity) is never achieved naturally, or at all, and several of these are diseases I have worked on (malaria, HIV, Ebola all for different reasons). It is not, as sometimes imagined, an all-or-none state, or one that is in any way inevitable as infection occurs and spreads. When COVID-19 emerged we had no knowledge of whether, and for how long, immunity would be induced by infection and did not for some time; this was a matter for technical debate.

6.17. Population immunity is only sensible as an aim of policy if the method of achieving it is with an effective vaccine. For diseases with highly effective long-lasting vaccines such as seen with measles or smallpox it may be a reasonable policy goal if very high vaccine coverage can be achieved. In this case people acquire the immunity without the attendant risks of the disease via vaccination and, since they cannot acquire the disease they cannot pass it on. But this relatively low risk approach to achieving population immunity is specific to vaccination, and only for a limited number of diseases with highly effective and long lasting vaccines.

6.18. Not all effective vaccines achieve significant, or even any, population (herd) immunity; an example is tetanus vaccine which only protects the vaccinated person (and their newborn child in the case of pregnant mothers). Some vaccines may be effective as disease-modifying vaccines rather than epidemic-modifying so reduce mortality but not transmission. A fuller explanation is laid out in a Gresham lecture I gave here (30th April 2020 **(CJMW/165 – INQ000203926)** and 10th February 2021 **(CJMW/166 – INQ000203927)**) and can also be seen in a previous lecture, prior to COVID-19, on controlling epidemics where I talked about herd immunity (but only in the context of vaccines) **(10th October 2018 - CJMW/186 – INQ000183383).** I expand on this point in my personal statement for Module 2.

6.19. Therefore even with an effective vaccination population immunity may not be a sensible goal of policy. Without one it will never be in my view.

6.20. Population immunity (herd immunity) may be an inevitable function of large sections of the population becoming infected in some diseases for which there are no countermeasures, long-lived immunity does occur and population immunity therefore gradually accumulates as the disease spreads. It is therefore potentially one exit from an epidemic for some widespread infections which cause long lasting immunity where there are no effective medical countermeasures. This is accompanied however with substantial harm at a population level if the disease causes serious symptoms or death in a significant proportion of those infected (as COVID-19 does); I laid this out in a longer strategy document to Ministers previously described **(21st March 2020 - CJMW/083 – INQ000203890)** and others. There was early in the pandemic no way of being sure that there was any long-lived immunity to COVID-19, if so what proportion got this, or the proportion of the population infected asymptomatically, among other key variables.

6.21. Population immunity accumulation is an important part of modelling an epidemic, to the extent it occurs, as it affects possible trajectories and was therefore correctly discussed by modellers and others at various points in the pandemic, including the early stages before we had any data on immunity. This is not in any way the same thing as having it as a goal. People often get immunity to severe disease, even without acquiring immunity to infection. This is a very important distinction. It is commonly the case with many viruses, bacteria and parasitic disease that the first time someone gets a disease is the worst episode and subsequent infections are less severe. This does not however provide protection to others, only to the person infected.

6.22. There was a school of thought held by a minority of academics most fully laid out in the Great Barrington Declaration **(CJMW/187 – INQ000203988)**, that it would be possible to provide very effective shielding (which they termed 'focussed protection') to those more vulnerable to COVID-19 and that it would then be possible to allow the infection to move through the rest of the low risk population so achieving population immunity. Their hope was this would avoid the need for lockdowns. The OCMO was not convinced by this policy, or variants of it, at any stage and nor were SAGE. I explained my strong scepticism over this suggested approach in public, including in a Select Committee hearing in November 2020 and a BMJ interview published 4th November 2020 **(CJMW/188 – INQ000236239)**. In summary my view was, and is, that it was scientifically weak, operationally impractical and ethically difficult.

6.23. The biggest scientific weakness is that it starts from the thesis that inevitably herd immunity will be acquired if you leave things long enough. That is not the case for a very large proportion of the most important diseases in the world. For most of the major disease I have worked on, you never acquire full herd immunity. Basing a policy on the assumption that eventually immunity in the less at risk population will protect the others is not a safe starting point.

6.24. A second issue that is problematic is the assumption that you can achieve what they call 'focused protection', by which the authors mean identifying all the people who are vulnerable and keeping them out of the way of anyone who might have the disease. That is theoretically a perfectly attractive idea but an entirely impractical one with this disease, which has a huge force of transmission. You can catch it from people who do not have many, or any symptoms, it is highly transmissible and is everywhere. The idea that you can use 'focused protection' and do it for year after year with the

vulnerable shielding throughout, with all the downsides such as loneliness this implies is simply impractical.

6.25. If this had been attempted prior to vaccination providing immune protection against severe disease and mortality, many vulnerable people would have been infected without any immune protection, and inevitably a significant proportion of them would have died.

6.26. I shared the view of the Director-General of the World Health Organization that, given all of those, to have this as an element of policy would be ethically really difficult.

Facemasks

6.27. The Technical Report by the CMOs and GCSA has a much fuller coverage of this technical area.

6.28. There is good evidence that properly worn surgical-grade masks in high risk environments where close contacts are made, such as hospitals, have a significant effect on transmission and this was accepted from early in the pandemic. The evidence on effectiveness of masks in the community, both for stopping infectious people from infecting others and for protecting the mask wearer from becoming infected, was initially considered weak by NERVTAG, WHO and others. Indirect evidence of benefit in reducing transmission however accumulated, and given their low risk and marginal inconvenience the benefits of wearing them are now widely promoted especially for enclosed or indoor environments where people are in close contact with limited ventilation.

Use of testing

6.29. Tests for COVID-19 were developed early in the pandemic. There are broadly two kinds of tests; antigen ('you are infected now') and serology ('you have been infected at some point in the past') tests. The former were more in the public eye due to the widespread use of PCR tests from relatively early in the pandemic and lateral flow tests (LFTs) later in the pandemic.

6.30. The UK did not have a large scale testing infrastructure prior to 2020 and was limited in the extent of test usage in the early stages of the pandemic due to an inability to scale up testing rapidly. Early in the pandemic more emphasis therefore had to be

placed on symptoms, as a way to identify those who needed to isolate. This changed as the pandemic progressed as tests were made widely available, and with quick results.

6.31. There was initial uncertainty about the use case for different tests. The OCMO emphasised the need to identify what one wanted to achieve with testing, given the limited available tests, and then work back from that point rather than identifying a test and then looking for a use case. The appropriate use for a test depends on a number of factors. This includes:

- Sensitivity- how well a test identifies someone with the virus. A test with 99% sensitivity will identify 99 true positive out of 100 with the virus.
- Specificity- how well a test excludes those people who do not have the virus. A test with 90% specificity identifies 90 true negatives out of 100 without the virus.
- Prevalence of the virus in the population. Changing prevalence will change the suitability of a test for a given task.
- Speed- the time it takes from taking a test to getting a result to the user will alter what a test can be used for.
- Ease of use- for example for home testing.

All of these required reliable testing against established criteria; relying on company reported results was high risk.

Hospitalisation and deaths

6.32. Identification of those who were at highest risk from serious illness, hospitalisation and death from COVID-19 was clearly an important fact to ascertain. There is a technical difference between infection fatality rate IFR (the proportion of those infected who die) and case fatality rate CFR (generally the proportion of those with symptoms and an infection who die). In diseases where a lot of people are infected asymptomatically IFR will be lower than CFR. IFR is not possible to calculate accurately without a test that picks up asymptomatic cases. The Technical Report previously exhibited has a section which covers the quite technical area of calculating these figures over time and the steady improvements of methodology that occurred over the first 6 months of the epidemic **(CJMW/001 – INQ000203933)**.

Death

6.33. The infection fatality rate was and is low compared to the previous novel coronaviruses SARS or MERS, but high compared to prior human coronavirus 229E, NL63, OC43 and HKU1 that cause cold-like symptoms, so extrapolating from any of them would have been hazardous.

6.34. On 27th February 2020 SAGE agreed with the estimation of a 2-3% CFR for the initial (Wuhan) variant with a wide variation depending on age and with a fair degree of uncertainty **(CJMW/189 – INQ000203873, CJMW/190 – INQ000203874)**. That changed later in the pandemic, with new variants and the roll-out of vaccine altering the relationship between infection and death.

6.35. It was not until late spring 2020, when many countries were experiencing high transmission and testing was being ramped up alongside surveillance studies, that a shift from CFR to IFR occurred and estimates converged towards an IFR of 1% **(CJMW/191 – INQ000047972)**. This estimate fell within the previous SAGE and NERVTAG estimate.

6.36. Mortality rates varied considerably across the population, with the strongest risk factor by some way being older age; this was identified early. Other risk factors for mortality include pre-existing health conditions including obesity. The understanding of who was at risk changed through the pandemic, but older age was established early and remained the most common risk factor. Had young children also been at significantly increased risk (as is the case for example for 'flu) this would have led to a different response for example on school closures.

6.37. People from ethnic minorities were at higher risk of mortality from COVID-19 overall. There was a complex interaction between COVID-19 and ethnicity that became clearer with time. The increased representation of people from ethnic minority groups was in large part due to increased risk of being infected due to occupation (e.g. in close contact occupation) or living in higher risk areas, but there were additional factors. I commissioned a report on this from Professor Kevin Fenton published in June 2020 **(CJMW/192 – INQ000203982)**. Subsequent studies built on this work. The risk by ethnicity changed over the course of the pandemic.

6.38. As with most epidemic infections those in areas of deprivation suffered most from higher infection and mortality.

Hospitalisation and identifying the most vulnerable

6.39. Admissions to hospital and intensive care units with COVID-19 were important metrics in the pandemic. Understanding delays between infection and severe disease was also crucial in estimating the correct denominator and likely rates of severe disease at any given point. For COVID-19, the mean delay from infection to death was around 4 weeks but with wide variation.

6.40. Since the beginning of the pandemic, it was clear that certain groups were more vulnerable to severe illness, hospitalisation, and death. The OCMO, principally Professor Harries, provided advice to policy teams and Ministers on this matter.

6.41. On 5th March 2020, SAGE discussed the concept of shielding the most vulnerable – this was first termed 'cocooning'. The aim of this was that in waves of infection the most vulnerable would be least likely to get infected.

6.42. On 7th March 2020, a group of senior clinicians across PHE, DHSC, NHSE and NHSD (including the DCMOs) discussed the approach to protecting the most vulnerable. It was agreed that there should be two groups – a wider vulnerable group (approximately 17m people who are above 70 and/or have chronic health conditions) to whom guidance would be issued and an extremely clinically vulnerable group (approximately 1-2m people with immunosuppression or specialist conditions) who would be proactively contacted. Both these groups would need to receive specific advice with respect to social distancing. The first group was broadly based on the cohort who are eligible for the flu vaccine.

6.43. A substantial amount of work was undertaken by colleagues across OCMO office, DHSC and the NHS to identify which conditions should be included in the extremely clinically vulnerable group. On 17th March 2020, a final draft list of the extremely clinically vulnerable cohort was circulated to the Senior Clinicians Group, and final amendments were made. On 18th March, OCMO wrote to the NHS Digital lead to ask them to identify patients that fell into the agreed cohorts, so that they could be contacted with a recommendation to follow stringent social distancing measures for 12 weeks **(CJMW/193 – INQ000048118)**.

6.44. Concurrently with the process to identify the extremely clinically vulnerable cohort, the Government published advice on 16th March 2020 advising those at increased risk of severe illness (the first, wider group) to be particularly stringent in following social distancing guidance; this was for their own protection.

6.45. On 21st March 2020, I, alongside NHSE colleagues, sent a CAS letter to NHS clinicians asking for assistance in identifying the highest risk patients **(CJMW/079 – INQ000068544)**. The highest risk cohort was named the clinically extremely vulnerable (CEV) group and it encompassed the initial group identified by NHSE colleagues (as described above), as well as a group that specialist clinicians were asked to identify and a group that GPs were asked to identify. People in these groups were advised to 'shield' for an initial period of 12 weeks from 23rd March 2020. This was then extended to apply until 30th June 2020.

6.46. In April 2020, the UK Clinical Panel for Shielded Patients (chaired by Professor Harries and with senior clinical representation from all UK CMOs offices) was established to review the evidence around which groups were most vulnerable and make recommendations to the UK CMOs as to who should be added to the Shielded Patients List.

6.47. In May 2020, I commissioned NERVTAG to develop a risk stratification tool, using the evidence from the first few months of the pandemic to assess who was most vulnerable to poor outcomes from COVID-19. Professor Julia Hippisley-Cox (Professor of Clinical Epidemiology and General Practice at the University of Oxford) led this work. The tool was coined 'QCOVID'.

6.48. From 6th July 2020, advice to the CEV group was made less restrictive. Professor Harries provided clinical advice to inform this decision **(CJMW/194 – INQ000203905)**:

> *"We have now received initial clinical advice from the DCMO that the incidence rate in the community is sufficiently low that advice for those in the CEV group to shield could be paused. The DCMO has advised that the CEV group could be advised to follow the same guidance as the clinically vulnerable (CV) group from the end of June, noting that it will be important to maintain the CEV cohort, even if advice is stepped down, to allow us to rapidly step up support again should this be needed in the future. There are likely to be significant associated psychological as well as physical impacts of a change in policy. It is therefore recommended to be managed gradually and with detailed clinical professional as well as patient and public communications."*

6.49. When the vaccine rollout began in December 2020, the CEV group was deemed a priority group by JCVI and hence included in Phase 1 of the roll-out.

6.50. The CEV group was again advised to shield from 5th January 2021 due to rising case numbers. This advice ran until 1st April 2021, when it was paused and the CEV group were advised to follow the national restrictions alongside the rest of the population, whilst taking extra precautions. From 19th July 2021, the CEV group were advised to follow the same guidance as everyone else. On 15th September 2021, the shielding programme was formally stood down; this was largely due to the success of the vaccine program. The DCMOs provided advice on this on 23rd July 2021 **(CJMW/195 – INQ000203914)**.

Droplets, aerosols and surfaces (fomites)

6.51. For SARS-COV-2 it was clear from an early stage that it was predominantly an infection spread by the respiratory route. The early reporting out of China implied this and subsequent data confirmed it. There remained uncertainty about the relative split between droplet, aerosol and surface transmission as outlined above.

6.52. Respiratory viruses can be spread in a number of ways. When COVID-19 emerged one of the important questions to answer was which routes of transmission were important. This is explained by the WHO **(23rd December 2021 - CJMW/196 – INQ000203978)**:

> *"- Current evidence suggests that the virus spreads mainly between people who are in close contact with each other, for example at a conversational distance. The virus can spread from an infected person's mouth or nose in small liquid particles when they cough, sneeze, speak, sing or breathe. Another person can then contract the virus when infectious particles that pass through the air are inhaled at short range (this is often called short-range aerosol or short-range airborne transmission) or if infectious particles come into direct contact with the eyes, nose, or mouth (droplet transmission).*
>
> *- The virus can also spread in poorly ventilated and/or crowded indoor settings, where people tend to spend longer periods of time. This is because aerosols can remain suspended in the air or travel farther than conversational distance (this is often called long-range aerosol or long-range airborne transmission).*
>
> *- People may also become infected when touching their eyes, nose or mouth after touching surfaces or objects that have been contaminated by the virus."*

6.53. Several routes were recognised early on as possible routes of transmission **(14th February 2020 - CJMW/197 – INQ000047770, 14th February 2020 - CJMW/198 – INQ000047771)**. This can be seen in the measures introduced to limit transmission. There was scientific debate about the relative importance of each, with particular focus on suspended aerosol transmission. The exact proportion of each still remains uncertain, but the scientific central view has shifted to consider suspended aerosol as being of more importance (a greater proportion) than was originally thought. In turn this led to a greater emphasis on the role of ventilation. This can be seen in the Environmental Modelling Group (a SAGE sub-group who provide advice on the role environmental modelling, data analysis and environmental sampling can play in understanding COVID-19 transmission) documents here **(30th September 2020 - CJMW/199 – INQ000203993, CJMW/200 – INQ000203979)** and in the campaigns launched on ventilation **(18th November 2020 - CJMW/201 – INQ000203922)**.

6.54. Fuller details can be seen in the Technical Report of the CMOs and GCSA.

Asymptomatic transmission

6.55. Whether, and to what extent, there was asymptomatic infection and asymptomatic or pre-symptomatic transmission was debated from the beginning of the epidemic, with robust data accumulating slowly in the global literature. This gradual accumulation is laid out in the Technical Report to future CMOs and GCSAs **(CJMW/001 – INQ000203933)**. This was a global view- for example on 9th June 2020 Dr Maria Van Kerkhove, the WHO's technical lead on the COVID-19 pandemic, made it clear that the actual rates of asymptomatic transmission were not yet known.

6.56. For SARS and MERS, two other coronaviruses which emerged recently, asymptomatic and pre-symptomatic transmission is thought to be very rare although asymptomatic infection without transmission may occur. This influenced initial thinking. Diseases where a small proportion of infected people are infected from an asymptomatic source, even when it occasionally occurs, can be controlled by removing only those who are symptomatic as this would be likely to pull R below 1 and end an epidemic.

6.57. Asymptomatic infection and asymptomatic transmission are different and care is needed not to conflate them. Asymptomatic infection is where a person has acquired the virus but does not have symptoms; it occurs in many diseases. Asymptomatic viral transmission occurs when the infected but asymptomatic person passes the virus on

to someone else. Asymptomatic infection does not necessarily lead to asymptomatic transmission (though it is a prerequisite). In principle it is possible to have extensive asymptomatic infection with almost no asymptomatic transmission. Asymptomatic transmission or not is also not a binary division- for some diseases there is a correlation between severity of symptoms and infectiousness with a mildly symptomatic person being less infectious than a severely symptomatic one. Many symptoms, such as coughing and sneezing, are themselves part of the transmission mechanism (fewer symptoms leads to lower transmission). People tend to avoid those obviously symptomatic and symptomatic people tend to try to protect others by avoiding close contact with them (so more symptoms lead to lower transmission). Someone who is infected and infectious may start as asymptomatic and then become symptomatic (pre-symptomatic) or they may have symptoms that are very mild and so will not alter their behaviour or necessarily be seen by the individual as symptoms (pauci-symptomatic). Whether to classify pre-symptomatic and pauci-symptomatic individuals as asymptomatic or not adds to the difficulty of knowing the degree of asymptomatic transmission. There are important practical differences between pre-symptomatic and asymptomatic spread.

6.58. Asymptomatic and pre-symptomatic transmission are for these and other technical reasons not easy to study. In the absence of a reliable test that detects infection in an individual without symptoms, determining who is asymptomatically infected is not possible.

6.59. Asymptomatic transmission (or not) is important as one part of the response to a pandemic is isolating those who have the virus **(CJMW/202 – INQ000048273)**. Before a rapid test is widely available this can be done by asking anyone with a specific set off symptoms to isolate. The higher the level of asymptomatic and pre-symptomatic transmission the less well this will work.

6.60. It was recognised at an early stage of the initial outbreak that asymptomatic transmission could be a possibility **(25th January 2020 - CJMW/203 – INQ000047556)**. As with many areas of knowledge on COVID-19 knowledge about the degree of asymptomatic transmission accumulated over time, with a gradual shift towards emphasising the role of asymptomatic infection being important. There was no single instance or study where it suddenly became clear that asymptomatic transmission was happening in x% of cases. It is possible to see the changing evidence by looking at the

minutes of NERVTAG and of SAGE from January 2020 to June 2022 which refer to both asymptomatic infection and asymptomatic transmission:

NERVTAG 21st January **(CJMW/204 – INQ000023119)**:

"there are currently no data on infectiousness in relation to symptom onset and whether asymptomatic or subclinical patients are infectious."

NERVTAG 28th January **(CJMW/205 – INQ000047820)**:

"members were not unanimous but the predominant view was that the force of infection from asymptomatic individuals, if present at all, is likely to be lower than symptomatic individuals."

SAGE 28th January **(CJMW/206 – INQ000057492)**:

"There is limited evidence of asymptomatic transmission, but early indications imply some is occurring."

SAGE 4th February **(CJMW/207 – INQ000051925)**:

"asymptomatic transmission cannot be ruled out and transmission from mildly symptomatic individuals is likely."

NERVTAG on 21st February one member brought up some evidence that **(CJMW/208 – INQ000119469)**:

"suggests that 40% of virologically confirmed cases are asymptomatic. Another noted *the data on asymptomatic and symptomatic proportions in China are not well documented."*

SAGE 13th March asked PHE **(CJMW/209 – INQ000109142)**:

"to contact Italian counterparts to request serology samples. If available, PHE to test these samples to ascertain symptomatic vs asymptomatic case ratio."

SAGE 16th March **(CJMW/210 – INQ000075664**

"antibody testing is particularly vital to address the central unknown question of the ratio of asymptomatic to symptomatic cases."

NERVTAG 3rd April **(CJMW/211 – INQ000220209)**:

"there is information available on the detection of infection in asymptomatic individuals but little information on the transmission risk from asymptomatic individuals…. the importance of clarifying between pre-symptomatic transmission

and asymptomatic transmission and using the correct terminology. It was agreed that there is data of pre-symptomatic transmission (both direct and indirect, based on the models) both pre-symptomatic and asymptomatic transmission are assumed in the SPI-M models. In their model, ~40% of cases don't seem to display symptoms and these cases are given an arbitrary assumption of 50% infectiousness compared with symptomatic cases. Imperial have a similar model and use similar assumptions… They concluded that *the level of 50% for asymptomatic infectiousness was realistic and recognised that more data is required."*

NERVTAG 24th April PHE reported that **(CJMW/212 – INQ000120161)**:

"swabs were taken in six care homes in London over the Easter weekend. All residents and staff were sampled and a total of approximately 500 swabs were collected. The six care homes were at different stages of outbreak. One of the homes had only identified two cases and had very few symptomatics. It was found that 75% of the residents carried the virus and only 25-33% were symptomatic. Approximately 45% of the healthcare workers were also carrying the virus, with 25-33% symptomatic."

1st May NERVTAG **(CJMW/213 – INQ000220211)**:

"SPI-M and Imperial use an estimated figure of 50% infectiousness for asymptomatic compared with symptomatic infections. The proportion of asymptomatic infections is age-dependent in the SPI-M model, from approximately 75% in children to <20% in the over 70s. Snap shot data may be misleading as some individuals may be pre-symptomatic not asymptomatic. Members discussed the strength of the evidence of infectiousness of asymptomatic individuals. The assumption used for modelling is asymptomatics are 50% as infectious as symptomatics. JE referenced work from Vietnam and Germany which appears to show asymptomatic transmission but acknowledged the difficulty in distinguishing asymptomatic from pre-symptomatic infection."

13th May NERVTAG **(CJMW/214 – INQ000070297)**:

"noted that NERVTAG had been asked to comment on the proportion of individuals who were truly asymptomatic and the relative infectiousness of those individuals. AH's team have produced a systematic review, using papers with complete follow-up. The pooled estimate is 11% (CI of 4-18%), with a wide range

of values in the studies. Members discussed other reviews and suggested that this value was low compared with other estimates, which average around 30%."

14th May SAGE **(CJMW/215 – INQ000120519)**:

"NERVTAG has reviewed various studies on asymptomatic infection. Many do not differentiate between asymptomatic/pauci-symptomatic individuals and pre-symptomatic individuals. SAGE noted that longitudinal sampling in the ONS study will assist in clarifying this difference going forward but needs to include more than "asymptomatic on the day of infection". Taking all evidence into account, between 10% and 35% of individuals may be truly asymptomatic (low confidence), and many more may have few symptoms. Review of ONS data will help refine the estimate. It is possible that asymptomatic individuals are less infectious, but this cannot currently be quantified. There is a key knowledge gap concerning how positive testing correlates with the presence of live, recoverable virus (i.e. infectiousness), although PHE is currently investigating this."

11th June SAGE said **(CJMW/216 – INQ000120527)**:

"the percentage of people who are asymptomatic remains uncertain and could be between 30-80%; it may vary by age and other characteristics."

18th June SAGE said **(CJMW/217 – INQ000062591)**:
"individuals likely to facilitate the seeding of super-spreading events may be asymptomatic or paucisymptomatic. Understanding asymptomatic infection is key to understanding super-spreading events."

6.61. On 9th July 2020 WHO published a report acknowledging asymptomatic transmission **(CJMW/218 – INQ000203997)**. It still concluded that the scale of asymptomatic transmission remained unknown.

6.62. NERVTAG looked at 22 studies prior to 25th August 2020 and found a pooled estimate for the asymptomatic proportion of SARS-CoV-2 infections was 28% (95% CI 20%-35%) **(CJMW/219 – INQ000203996)**. Note that this is for infection, not transmission.

6.63. The exact proportion of asymptomatic transmission has still not been established beyond doubt and has likely changed over time. The current central view is that SARS-COV-2 has a greater proportion of asymptomatic transmission than previously seen with other major coronaviruses. The proportion is likely to have changed throughout the pandemic with new variants with different infectiousness, and with the roll-out of

vaccination meaning people have immunity which tends to make symptoms less severe, or apparent.

Reinfection

6.64. It was uncertain at the start of the pandemic how protective having had a previous infection was. Over time it became clear that a previous infection was partly protective against future infection. There were very few reinfections identified early in the pandemic. However, as the virus mutated, and the time between infection and presentation got longer, we started to see more reinfections.

6.65. Risk of reinfection has varied widely in epidemic-potential infections, ranging from lifelong infections where people remain infectious from infection to death such as untreated HIV, infections where a single short-lived infection generally confers lifelong protection such as measles, and infections where prior infection provides partial, temporary, or minimal protection from subsequent infection such as influenza and malaria. Cross-protection between different variants of a disease is also highly variable.

6.66. Extrapolation from biologically similar or evolutionarily related pathogens provided the earliest clues to whether reinfection was likely, and after what interval. Immunity to SARS-CoV-1 and MERS-CoV was thought to wane over time based on best available evidence, and there was evidence of confirmed reinfections with seasonal human coronaviruses. This meant that from an early stage there was an assumption that reinfections with SARS-CoV-2 were possible. There was also a reasonable assumption that the virus would mutate over time which in turn could impact reinfection risk through immune escape.

6.67. Early data on the proportion of individuals who mount an antibody response to SARS-CoV-2 infection, and the timescale of this antibody response, became available in the first few months of the pandemic. Antibodies did not inevitably mean protection from infection (nor did lack of antibodies preclude it) but they were thought to be correlated (subsequently confirmed).

6.68. The first published case reports of SARS-CoV-2 reinfection confirmed by whole genome sequencing emerged in mid-2020. Several other reports of reinfection emerged at this time, though many did not have sufficient data to distinguish between persistent primary infection and reinfection.

6.69. In late 2020 and early 2021, large scale longitudinal studies such as SIREN and VIVALDI confirmed the possibility of reinfection but demonstrated the protective effect of prior infection as measured by antibodies.

6.70. For example, SIREN study analysis published in early 2021 showed that SARS- CoV-2 reinfection was possible and could occur, but that there was an over 80% reduction in infection among people who had previously contracted COVID-19 compared to those who had not.

6.71. As new variants emerged, there was a need for further data on risk of reinfection and how it was impacted by the changed antigenic makeup of the new variant. Throughout 2020, national surveillance data was used to monitor reinfections, including with newly emerging variants, and showed evidence of increased reinfections with the emergence of the Delta and Omicron variants. In all cases confirmed positive on a daily basis on average until mid-November 2021 around 1.4% were in those who have previously been infected (and therefore counted as reinfections), increasing to 10% in January 2022 following the emergence Omicron.

Conclusion

6.72. I hope that the above goes some way to assisting the Chair in understanding the work of the OCMO in respect of matters relating to Module 2 of the Inquiry (and potentially future modules).

6.73. Whilst there are many documents that have been referred to in this statement, I would commend, in particular, the Technical Report of the UK CMOs and GCSA as worthy of detailed consideration. That report was written specifically for public health and scientific leaders facing a new pandemic or major epidemic and draws together the learning from a wide range of expert authors, who I have been fortunate enough to work with, in an effort to learn lessons from this global tragedy. It expands considerably on several of the technical points made in this statement, and adds technical depth.

6.74. The small team within my private office (together with myself and DCMOs) continues to work hard, alongside their other responsibilities, to support the Inquiry in respect of disclosure and the provision of other relevant information. I am happy to provide further assistance to the Chair in this and any future modules, including the provision of oral evidence should it be necessary.

Statement of Truth

I believe that the facts stated in this witness statement are true. I understand that proceedings may be brought against anyone who makes, or causes to be made, a false statement in a document verified by a statement of truth or without an honest belief of its truth.

Signed: **Personal Data**

Dated: 15th August 2023